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John P. Barrett for Electrical Supervisor.

Mr. John P. Barrett, of Chicago, has been asked by a number of electrical people of Chicago to serve the World's Columbian Exposition as superintendent in charge of the Electrical Department. Mr. Barrett will be a splendid man for the place if he will accept. His knowledge of the business, force of character and independent nature, particularly fit him for a work of this kind. The following is a copy of the petition and signatures received up to the date mentioned.

CHICAGO, June 27, 1890.

We, the undersigned, representing electrical interests and industries, request the selection of Mr. J. P. Barrett, electrician of the city of Chicago, by the Board of Directors of the World's Columbian Exposition, to have practical charge and control of the Electrical Department of the Columbian Exposition.

Frank A. Wunder, Western agent Schuyler Electric Co.; Frank J. Baker, Western agent United Electric Traction Co.; F. S. Terry, manager The Electrical Supply Co.; B. E. Sunny, president Chicago Arc Light & Power Co. and Western manager Thomson-Houston Electric Co.; F. S. Gorton, manager The Chicago Edison Co.; W. P. Adams, general manager Western Power Construction Co.; Herbert Wadsworth, Western manager Excelsior Electric Co.; Jas. A. Lounsbury, National Engineering Bureau; H. F. Winston, president Illinois Electrical Material Co.; W. S. Salisbury, Electrician American Electric Motor Co.; E. M. Barton, president Western Electric Co.; C. A. Brown, vice-president Electric Illuminating Co.; C. H. Wilson, superintendent Chicago Telephone Co.; H. B. Stone, president Chicago Telephone Co. and president Central Union Telephone Co.; E. B. Chandler, general western agent Gamewell Fire Alarm Co.; L. B. Firman, general manager The Police Telephone and Signal Co.; Francis W. Parker; Geo. C. Bailey, manager John A. Roebling's Sons Co.; F. G. Beach, president Chicago Electric Club; Foree Bein, electrical engineer, Chicago; John W. Calkins & Son, Chicago office Rockford Electric Manufacturing Co.; E. E. Keller, manager Chicago office The North American Cons. Co.; E. L. Powers, manager Electrical Industries; H. W. Hall, manager The Hall Signal Co.; Ed. Stockwell, agent Ball Electric Light Co.; McIntosh Battery and Optical Co., 141 and 143 Wabash avenue; Electrical Merchandise Co., A. H. England, secretary, 11 Adams street; J. L. Barclay, general district agent Westinghouse Electric Co., Railway Depot; B. F. Stewart, president Emery Electric Mining Machine Co; C. B. Osgood, contracting agent Westinghouse Electric Co., Railway Depot; C. M. Barclay, 151 Van Buren street; Charles T. Page, secretary and treasurer Englewood Electric Light Co.; Geo. H. Bliss; R. C. Clowry, vice-president and general superintendent Western Union Telegraph Co.; F. H. Tubbs, superintendent Western Union Telegraph Co.; W. J. Lloyd, assistant superintendent Western Union Telegraph Co.; Elbert C. Ferguson, attorney, 94 La Salle street.

Electricians in Michigan say there are more inquiries in for electrical roads at this time than ever before known.

Electricity as a Moral Agent.

Electricity has stepped in mercifully to alleviate the miseries of the early riser on dark Winter mornings. An arrangement has been devised by which a connection is made between the room clock and the stove. The clock indicator is set over night to any required hour, and when the hour hand reaches that time in the morning, an electric connection is established with the stove, which is then lighted by an electric spark. The sleeper in the meantime is not disturbed. As the temperature rises, however, it is indicated by a small thermostat, and when it has reached a point of Summer-like comfort, an alarm is sounded. The sleeper, of course, is awakened, but the act of jumping out of bed has no terrors for him, the morning ablutions are performed without a shudder, and the necessity for occasional lapses into profanity is checked.

A Quick Installation.

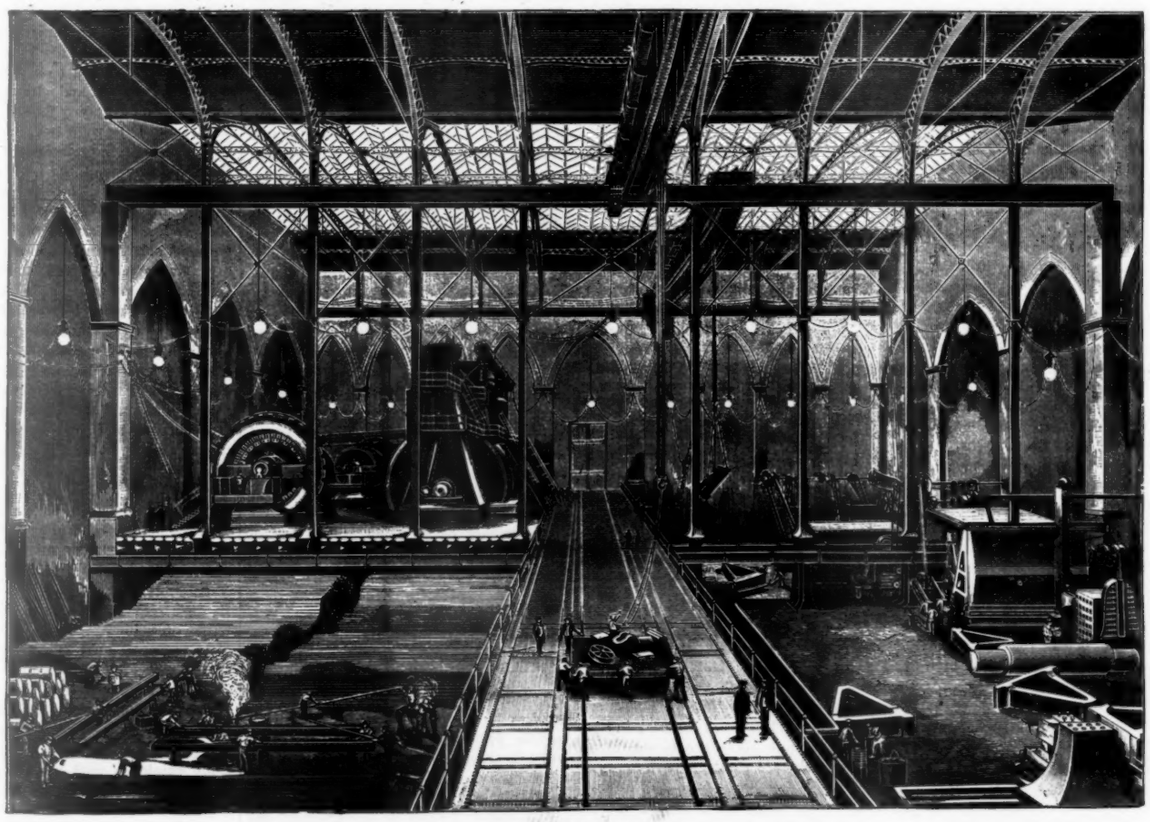
Two days before the Fourth of July, the dynamo at Paul Bauer's plant, Coney Island, was burned out, and the Complete Electric Construction Company, of this city, was requested to immediately put in a new dynamo. General Manager Seely took the matter in charge himself, and within 24 hours a new 60-light dynamo was set up and running, and Mr. Bauer's establishment was able to run in full style to the great satisfaction of numerous Fourth of July visitors. It was not an easy thing to find a 60-light machine lying idle at the present time, and Mr. Seely's enterprise in helping him out of his difficulty is highly complimented by Mr. Bauer.

The Deptford Central Electric Lighting Station.

The Deptford station is, says London *Industries*, anything but completed, as far as erection of the plant goes, but in one sense it may be said to have been complete before it was begun, because every detail was planned out with the greatest care and forethought before the actual work was commenced, and a description of this station now will probably give a fairly exact idea of what the finished station will be like, and will be more interesting to our readers, as the Deptford scheme is exciting so much attention at present.

The visitor, on entering the building, is struck with its enormous size. At first one is lost in admiration of the pluck and enterprise shown in setting up business on such a scale, but the feeling is soon qualified by an uneasiness as to whether the pecuniary risk is not unnecessarily great in proportion.

The present position of the corporation as regards mains may be stated. They have made and put down a mile or so of their own mains, but they are not in use. They have, therefore, to depend on the Fowler-Waring concentric mains. These are too small, and with the load now in use the loss over them amounts to over 1,200 volts. The outer conductor is only lightly insulated, and would not stand this, and the leakage all along the line from it to earth



INTERIOR VIEW OF THE DEPTFORD, LONDON, ELECTRIC LIGHT STATION.

has given considerable trouble to the telephone companies. The corporation has, therefore, been obliged to use only the inner conductors of the cables, leaving the outer conductors idle. The action on the telephones due to the use of separate cables is avoided by crossing the leads frequently. Transformers have also been inserted at Deptford to get rid of the earth in the primary circuit.

One engine and dynamo is now doing the Grosvenor Gallery work, and another engine and dynamo are ready for work. The cables now in use are Siemens' concentric for distributing mains at 2,400 volts, and Fowler-Waring for temporary trunk mains. The Ferranti concentric mains are being made, and about a mile has been put down, but they are not in general use yet. They have been officially and otherwise tested, by cutting through the outer insulation with a pick-axe until the outer conducting tube is exposed. It may be safely grasped in the hand, as might be expected. The joints are long cones, so that any leakage would have to pass along a considerable distance to get to the other conductor. No doubt the ozokerit will really unite perfectly. In fact, ozokerit has, we believe, properties analogous to pure rubber, in the facility with which it will unite under pressure. A little warmth would certainly unite it. In this point vulcanized rubber is inferior. It will never repair a leak in its substance, whereas pure rubber, and probably ozokerit, will.

As there is little new to describe, we may devote some space to a critical discussion of the Deptford scheme, continued our London contemporary, not with the object of giving the London Electric Supply Corporation good advice, as we do not know that it has any need of it, but because the success or failure of the Deptford scheme is a matter which concerns not only the corporation itself, but also, and that perhaps to an even greater pecuniary extent, the whole electric light industry in the kingdom, and, to a considerable degree, even abroad. A great deal of the criticism with which the Deptford scheme has met, has been biased by rival interests. We do not mean that anything unfair has been said, but it is not possible for engineers who are throwing their whole energies into direct current work to be quite unbiased in discussing alternate distribution. The London Electric Supply Corporation's Provisional Order also came first at the recent Board of Trade inquiry, and the corporation had thus not only to defend its own particular system, but had to bear the whole brunt of the battle waged against alternating current system in general.

It has been said over and over again that the Deptford scheme is a wild experiment, and is more or less certain to end in a dismal failure, which will do incalculable harm to the industry generally. The first novelty is transmitting electrical energy at 10,000 volts. This is simply a question of insulation, but that is no small matter. The whole question of insulation for very high electromotive forces is very obscure. It would seem quite likely that it is not a question of the maximum difference of potential between the two leads—in this case, two concentric tubes—but of the rate of fall of potential; that is to say, the difference of potential between the faces of each little element of insulation. For instance, we can easily imagine that india-rubber will stand a stress of, say, 1,000 volts per millimetre, so that a large sheet one centimetre thick would stand 10,000 volts. In this case all the portions of the rubber have to stand equal stresses. But if the rubber is wrapped round a cylindrical conductor, the inner layers will be subjected to a greater stress than the outer; and if the stress is near the maximum, thickening the coating of insulation can do little good. The rate of fall of potential depends on the diameter of the cylinder, so that the larger the conductor, the easier it is to insulate it so as not to break down. On the other hand, the larger the conductor, the lower the insulation resistance measured in megohm miles, so that we have the paradox that a small conductor which shows a high insulation resistance may be more likely to break down than a large one with a comparatively low insulation resistance taken in megohm miles.

Then, again, there is the question of insulation conductivity; it may or may not follow that a material which conducts slightly is likely to break down. It is most probable that a dielectric breaks down suddenly, and that a microscopic conduction has nothing to do with this. If that is the case, insulation resistance measurements give no indication as to safety against breakdowns, except in so far as they localise an incipient fault.

These speculations may be considered somewhat crude and unsatisfactory. They are brought forward, however, merely as suggestions, as it does not seem as if these questions had ever been studied. We may find that a material which does not easily develop local faults, and is, therefore, best for telegraphic purposes, is apt to breakdown suddenly under a high electromotive force on account of a totally different order of properties. We may also find tubular conductors more easily insulated than solid rods of same cross section.

Returning to the Deptford trunk mains, there seems to be no reason why 10,000 volts is not practicable, especially with a conductor an in inch in diameter; but great difficulty may be expected in the joints, even when coned, and especially if expansion and contraction has any chance of "working" the joints. We would again suggest that the difficulty may, perhaps, not be in making the joint to give a high insulation resistance, but in arranging it so that the fall of potential over the insulation is always gradual. The problem is, in fact, analogous to designing a static electric machine so that it has no corners to form discharge points. Ozokerit is tougher and more elastic than paraffine wax, and does not seem to develop minute cracks on solidifying.

It must be borne in mind that even if the mains should prove incapable of standing 10,000 volts, which seems hardly likely, the only result will be increased capital expenditure for working at 5,000. The cost of leads would, of course, be serious, and the corporation shareholders will have lost some money from their capital account, but it will make no difference to the public at large. The money will simply be written off; competition will prevent its interest being charged on the consumers. The lead question is, then, not so important from our point of view as might at first sight appear.

Some trouble has already arisen from the action of the alternate current on the various telephone circuits with the temporary mains as already mentioned. Another difficulty may be expected with the permanent mains, with one end earthed, and at first sight it appears very serious. There are, however, several ways of arranging such circuits, so as to have neither leakage effects nor inductive influence on the telephones.

The enormous size of the dynamos has caused a great deal of comment. In one way, the dynamos are experimental, as nothing of anything like the proportions has ever been made before.

When the station will be completely at work on a large scale, it is somewhat difficult to say. It has been remarked that when a man reaches 50 he realizes that things take much longer than is expected. But there is little doubt that the Deptford station will, in the long run, be a success. The work is engineered by Mr. Ferranti, with the assistance of his partner, Mr. Sparke, and of Mr. Kolle. The corporation also owes much to the vigorous policy of Lord Crawford. If there is any one who, with practical common sense, careful forethought as to minutest details, and thorough knowledge of his subject, can successfully begin and complete this work, we believe it is Mr. Ferranti.

Perpetual Motion Again.

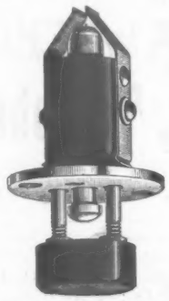
A Boston electrician and mechanic has invented a small machine with which he expects to solve the problem of perpetual motion. The machine works automatically. On a metallic hub there are eleven glass tubes, perfectly air tight, partially filled with a fluid, which flows from the hub to the ends on one side, and from the ends to the hub on the other, keeping the apparatus constantly out of a state of equilibrium, which keeps the hub and spokes revolving on a screw axis. The screw axis turns on centers, forming a diameter to a horizontal metallic ring which is supported by four small glass pillars to show that no outside force is secretly transmitted to the machine.

Increase of Capital Stock.

At a meeting of the Westinghouse Electric Company, held July 8th, a formal transfer was made of the property to the Westinghouse Electric and Manufacturing Company, and the capital stock was increased from $5,000,000 to $10,000,000. Of this, says a Pittsburgh exchange, only $3,000,000 is to be assessed at once, present holders having the right to one-half share for each one of old at $40 per share.

Dining Room Electric Push.

A new and convenient little appliance, for use in the dining room, is being manufactured by the Holtzer-Cabot Electric Company, of Boston. They call it the "O. K.," which is a very good name for it. This combination push consists of their regular



NEW ELECTRIC PUSH.

foot push and two plug connections, which can be inserted at will, making contacts with the two lower springs, thereby ensuring a good solid connection. The plugs are screwed into a polished hard-rubber piece, with a nut on under side to connect cord. The push is shown above.

Why Not Phonograph Bird Songs?

No one who, in reading for honors at Oxford, has taken up Aristophanes for one of his books will ever be able to forget that most entertaining writer in the accounts of his "Birds." Every one who has read the play will remember what the various birds have said, and how they said it. But neither Aristophanes himself, nor any other writer of verse or prose, could ever reproduce their notes, whether in writing or description, with any exactitude. You listen, and try to keep them in your mind, but it is a vain attempt. You endeavor to imprint each change on your memory, but as vainly; *abiit, evasit, erupit*. There have been numberless attempts to write down in words the notes of the songs of birds, but no one can say that they have been very successful. It occurs to me that it might be quite possible to take down every note of a bird's song by means of the phonograph, and, then, by reproducing them more at leisure, they could be written down "in score" by any musician, Art and Nature thus going hand in hand. I may be wrong, but that is what occurred to me as a "happy thought" while I listened to those liquid notes of the song-thrush on the bough overhead.

And, further, I thought what a solace it might be to some sufferer in a sick room to be able to enjoy the pleasure without the sad drawback of its being at the cost of some poor bird in a cage.—*London Spectator.*

Melting Zinc.

Zinc is troublesome to cast, and more troublesome when small thin molds are to be cast. Lining the mold with whiting and water, which must be allowed to thoroughly dry, will often cause the metal to fill the mold well. Burning of the zinc (oxidizing) may be prevented by covering the metal, while in crucible or ladle, with a layer of common salt, a little muriatic acid, which amounts to the same, as a coat of zinc oxide is immediately formed on the surface of the melted metal, which effectually prevents further oxidation from action of oxygen in the atmosphere. It is an improvement to keep a layer of charcoal on top of the zinc, or any other soft metal which can be melted in a ladle. The coating of oxide forms a protection against oxidation to only a certain degree, while the layer of charcoal tends to reduce the oxide again to its metallic form. Indeed, it is possible to recover lead, tin, zinc and antimony from the "dross" or oxide which gathers in the ladle. It is only necessary to melt the oxide with charcoal, salt and soda, to get it again into useful shape. The dross should be powdered, likewise the salt, charcoal and soda. Mix them together and melt. The soda and salt melt into a pasty mass and the carbon unites with the oxygen of the dross, leaving the metal free but burning off the charcoal. The salt and soda act simply as flux in reducing the oxides.

Harcourt's Pentane Standard Lamp.

BY H. E. CLIFFORD, INSTRUCTOR IN PHYSICS, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, IN THE QUARTERLY.

The great progress which has been made of late years in artificial lighting, particularly the enormous development in lighting by electricity, has given to photometric tests of the different illuminants a considerable importance. In making such tests, we are at once met by the difficulty of securing a satisfactory standard of light for reference. The so-called standard candle which, for lack of something better, is at present almost universally adopted as a legal standard, is far from constant in its illuminating power, being affected by slight variations in the material and form of the wick, temperature of the photometer room, and numerous other elements.

It seems desirable, however, in the selection of some new standard, that it should be approximately equal to the present standard candle; the expression so many candle-power conveying a certain idea, although in most instances a vague one, as to the amount of light which is given by any illuminating source. Constancy of composition in material consumed, effect of temperature and pressure of air upon the intensity of the light, and ease of manipulation, are also to be kept in view in the selection of a legal standard.

The following tests of the Harcourt Pentane standard lamp were carried on in April and May, 1888, by Messrs. E. R. Pearson and S. C. Hathaway, Jr., at that time students in electrical engineering at the Institute of Technology. The Pentane was prepared by Mr. Pearson from what is known as No. 86 gasolene, and after being refined was of specific gravity 0.6319. The lamps used in the tests were two, one lent by Mr. C. F. Prichard, Superintendent of the Lynn Gas Light Company, the other the property of the Institute. The Pentane lamp was devised by Mr. Harcourt to replace the Harcourt air-gas standard, which is not portable, and, moreover, involves the use of expensive apparatus. The nature of the flame is the same as in the standard, the essential difference between the two units being that in the standard the gas is prepared before its application, while in the lamp it is produced at the instant required. The gas issues from a circular aperture one-fourth of an inch in diameter, cut in a brass plug one inch in diameter and half an inch thick, the height of the flame and number of drops of liquid Pentane consumed per minute being easily regulated. In all tests the lamps were allowed to burn either 15 or 30 minutes before beginning the photometer readings, so that they might become of a constant temperature. The tests were of 50 readings each, unless otherwise specified. In determining the illuminating power in terms of candles, standard sperm candles were used, corrected to a rate of consumption of 120 grains per hour. The lamps were tested against each other, the Lynn lamp being taken as the unit, and were reversed in position. The Bunsen photometer was used in the tests, the photometer room being painted a dull black, and carefully screened to prevent introduction of error by reflection. The photometer bar was 100 inches in length.

In Tables I and II are given summaries of the tests of the two lamps against each other, the lamps for Table II being reversed in position. In Tables III and IV the results of comparing the lamps with standard candles and with the Methven long and short slot are given, the Methven being expressed in terms of the Harcourt lamp. The illuminating power is the mean as determined from 50 observations, the deviation is the average deviation from the mean, and the percentage deviation is given with regard to the mean illuminating power. The difference in illuminating power, as shown on reversal of the position of the lamps, has not been satisfactorily accounted for.

The Harcourt Pentane lamp, as a legal

standard, would seem to be a satisfactory one so far as mere intensity and constancy of illumination are concerned, although the uncertain quality of Pentane and the care required in using the lamp are undoubtedly objectionable.

TABLE I.
HARCOURT VS. HARCOURT.

No. of Observations.	Illuminating Power.	Deviation.	Per cent. Deviation.
25	1.021	0.014	1.37
25	1.017	0.016	1.57
50	1.008	0.009	0.89
50	1.014	0.011	1.08
50	1.016	0.008	0.78
50	1.034	0.008	0.74
10	1.028	0.010	0.99
50	1.011	0.012	1.16
50	1.018	0.009	0.87

TABLE II.
SAME—LAMPS REVERSED.

No. of Observations	Illuminating Power.	Deviation.	Per cent. Deviation.
50	1.051	0.012	1.01
50	1.056	0.007	0.61
50	1.053	0.008	0.73
50	1.055	0.007	0.70
50	1.055	0.005	0.51
50	1.055	0.006	0.54
50	1.057	0.005	0.51
50	1.050	0.006	0.61
50	1.056	0.005	0.48

TABLE III.—INSTITUTE HARCOURT.

Methven Long Slot.			Methven Short Slot.		
Illuminating Power.	Deviation.	Per cent. Deviation.	Illuminating Power.	Deviation.	Per cent. Deviation.
1.836	0.009	0.51	1.907	0.011	0.55
1.879	0.011	0.57	1.942	0.011	0.56

TABLE IV.—LYNN HARCOURT.

Candle A.			Cand'e B.		
Illum. Power.	Deviation.	Per cent. Deviat.	Illum. Power.	Deviation.	Per cent. Deviat.
1.081	0.030	2.77	1.083	0.012	1.06
1 111	0.016	1.41	1.108	0.012	1.07
1.085	0.014	1.21	1.074	0.011	0.97
1.015	0.012	1.11	1.064	0.015	1.38

Methven Long Slot.			Methven Short Slot.		
Illum. Power.	Deviation.	Per cent. Deviat.	Illum. Power.	Deviation.	Per cent. Deviat.
2.121	0.016	0.78	2.023	0.010	0.48
2.151	0.019	0.86	2.008	0.020	0.99

The Disaster to the "City of Paris."

Judgment has been delivered by the Liverpool stipendiary magistrate with whom were Captain Bragg and Messrs. Eames and Hallett, assessors, in the case of the steamship "City of Paris." The magistrate said on the arrival of the "City of Paris" at Queenstown, after the accident, she was only drawing eight inches, mean draught more than when she left New York. The Court were of opinion that full provision was made insure the ship's safety as an ocean-going steamer, and that the safety of the vessel was not sacrificed to speed. They considered cast steel to be a proper and suitable material to be employed generally in various parts of the engines, and the cylinders, piston rods, and other parts of the machinery of the starboard engine were generally of suitable material, and the engine room was properly constructed. The Court proceeded: "We are of opinion that the primary cause of the casualty was the extraordinary wearing down of the bearing of the bracket which supported the extreme end of the propeller shaft, by which that end had dropped from its original and proper position about seven inches; that the fact of this bearing down of the after end, coupled with the weight of the propeller and of the shaft itself, produced a bending effect on the shaft at its forward support, co existent with each revolution of the engine; that this probably produced rupture of the external surface, which gradually extended inwardly, and, finally, total fracture of the shaft; that the engine, being thus relieved from resistance beyond the friction of its own movable parts, would almost instantaneously have acquired a greatly accelerated velocity, the result of which would probably be sufficient, by the additional strain on the various connections, to diminish the clearance allowed between the piston and cylinder cover of the low-pressure engine at the top end of its stroke; that the cover was struck by the piston, and moved off, the piston probably being broken up in the act, the cylinder being torn asunder, the condenser being seriously broken, and the destruction of the various other parts rapidly accomplished. The report refers to the admirable manner in which the captain, deck officers, chief engineer and his assistants, and the crew generally, performed their duties and conducted themselves in the trying position in which they were placed after the accident."

Electrical House Devices.

Messrs. H. E. & C. Baxter, the well-known Brooklyn manufacturers of electrical goods, are introducing a number of new and convenient appliances for use in business and residences.

We illustrate in Fig. 1 their electric letter-box, which is largely used in flats and offices. The combination comprises letter-box, electric push button and mouthpiece, and is a great convenience to the postman in leaving mail, as well as possessing all the usual conveniences of such apparatus.

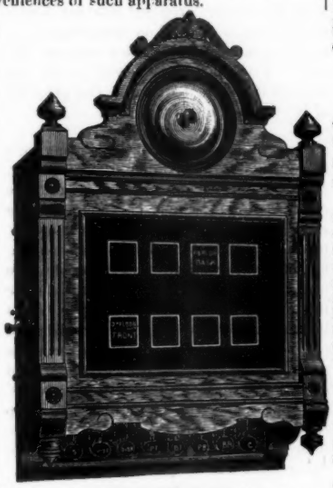


FIG. 2.—NEW BAXTER ELECTRIC BURGLAR ALARM.

The new style burglar alarm annunciator is shown in Fig. 2. This is generally located in the bed-room of the man of the house, and connections run to all the various doors, windows and other portions of the house. Should the burglar attempt to enter, the alarm will not only be sounded, but the annunciator will immediately indicate the whereabouts of the attack. The sale of these burglar alarms has been quite large, and they are handsomely and strongly made.

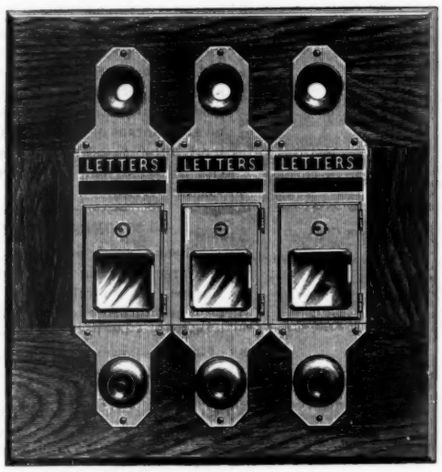


FIG. 1.—THE BAXTER ELECTRIC LETTER BOX.

The Arc Light for Projecting Photographs.

Dr. L. H. Landy, writing for The Journal of the Society of Amateur Photographers, says:

"A general adoption of the electric arc light for purposes of projection is not far distant, and having devoted some time to the subject, following it up from the days in which the current was produced from batteries until to-day, when we have on tap a current of electricity as we have gas or water supplies, it seems most fitting that my experience should be given to the members of this society, and my object in inviting you here this evening is to give you some experimental facts, and ask your verdict as to its application for lantern projections. * * The design of the lamp depends upon the condition with which it is to be supplied with current. That is, whether it is supplied by a constant potential with variable current, as is furnished by the Edison Company, or low tension current, that is, having a voltage of 115 to 120 volts; or whether it is fed from a variable potential and constant current of high voltage, as is used in series arc lighting. This current is known as the high potential, and the voltage runs in most cases from 1,000 to 3,000 volts. The objection to the latter is that to make an adjustment of the lamp the current must be turned off, and the lamp cannot be handled with the current on without danger, possibly attended with fatal results.

The current used for projection should be the low tension, for with this the lamp can be handled without danger, and all the adjustments may be made while the lamp is in operation.

The great advantage over all other methods of illumination is its small cost per candle power, its intensity, whiteness and parallel rays. These properties make it especially well adapted for purposes of projection, as it admits a larger number of rays to pass through the optical center of the condenser.

A Letter from Tacoma.

Here in Tacoma the street railway is extending its electric system by doubling the tracks to North Tacoma, and putting a new line on Tacoma avenue. For the extra service, 20 new cars have been ordered.

The Centralia city council has granted the American Construction Company a franchise for the construction and operation of a street railway line the entire length of the city. The time for commencing the construction of the line has been limited to 30 days, and for the completion of the line to six months; after 12 months the motive power to be electricity. C. L. Hamilton, of the company, is advertising for bids for poles and ties for the road.

A committee of Tacoma citizens are now framing a new city charter and they are being strongly urged by the laboring element to include a clause by which the municipality shall operate its own electric lights and electric railways.

The Seattle Electric Light Company has been reorganized, with a capital stock of $500,000, and will proceed to erect an additional plant. In the new organization, Messrs. T. H. Tyndall, Jas. A. McWilliams and J. H. McGraw, are interested.

Sheldon is to have an electric lighting plant.

Last Thursday, the cars started in the electric railway in Vancouver, B. C. The Thomson-Houston system is used. Mr. J. E. Winslow, the agent of the Thomson-Houston Company, and who has had charge of the work of fitting up the line and the power house, will operate the road for that company for one month, according to contract, after which it will be formally handed over to the local company. Mr. F. V. Nichols will be superintendent for the company, and there will be about 20 employés when the works are in full operation.

In the eastern part of the State electricity is exciting as much attention as in this western region. At North Yakima, the articles of incorporation of the Yakima Street Railway and Power Company, capitalization, $100,000, have been signed by Wayne Ferguson, M. V. Massey and L. McLean, of Spokane Falls, and Edward Whitson and L. S. Woodward, of North Yakima. The company proposes at once to begin the laying of three miles of track, on which electric motors will be operated. Two hundred men are now engaged in laying the water works mains and putting up the poles and wires for the electric lights at North Yakima. Superinterdent Woodward proposes to have the water works and electric lights in operation by the last of August.

In Spokane Falls there have been street fights over the right of way in Division street, the contestants being the old Spokane Street Railway Company, which was the first on the ground, and the City Park Transit Company and Electric Road, which is laying rails in Spokane Falls. H. L.

Tacoma, Wash., July 1.

Las Vegas, N. M.—The Las Vegas Electric Light Company; capital stock, $100,000; incorporators, T. B. Cation, E. Rosenwald and A. H. Whitmore.

Hamilton, Wash.—The Hamilton Electric Light and Power Company, of Hamilton, Skagit County, has been incorporated, with a capital stock of $50,000.

Kansas City, Kan.—The Gates City Electric Company, of Kansas City, Kan., recently filed articles to increase its capital stock from $10,000 to $30,000.

Chicago, Ill.—Electro Speaking Tube Construction Company, to deal in speaking tubes and electrical goods; capital stock, $80,000; incorporators, E. T. Orne, Warren Orne, Richard Robbins.

Osage City, Kan.—A new electric light company was organized in this city last week, with Charles Stackhouse as president and D. C. Lake as secretary. Work on the plant will commence at once.

Newark, N. J.—The Wenstrom Electric Dynamo and Motor Company, with offices in Newark, Jersey City and New York, was incorporated yesterday. The capital stock is $500,000, and the incorporators are all New York men, except Charles Peterson, of Whites, N. J., who holds 4,800 shares.

Rahway, N. J.—Articles of incorporation have been filed in County Clerk Rowell's office by the Rahway Electric Light and Power Company. The capital is $50,000, divided into 1,000 shares. The incorporators are John B. Simonson, of New York; Welles P. Ayer, of Boston, and Welles C. Bryant, of Newark. The company's plant will be located at Rahway.

Millersburg, Vt.—The Millersburg Electric Company was organized last week, with Charles E. Dustin of Middletown, Conn., president; P. B. Chase, Mt. Vernon, secretary and treasurer, and Charles E. Dustin, W. A. Sheldon, Wm. Bird, Jr., C. A. Bird and P. B. Chase (the latter three of Middletown), as directors. The company is incorporated, and its interests in Millersburg will be in the hands of competent persons.

Vancouver, B. C.—The Vancouver Electric Railway and Light Company, Limited, formed by the consolidation of the Vancouver Street Railway and the Vancouver Electric Illuminating Company, has a capital stock of $500,0 0. The following are the officers of the company: President, H. E. McKee; vice-president, Thos. Dunn; secretary-treasurer, H. T. Ceperley; board of directors, Geo. Turner, J. W. Horne and C. D. Rand.

Omaha, Neb.—Articles of incorporation were filed of the Electrical Coin Slot Advertising Company. The stockholders are John M. Thurston, J. F. Coykendall, W. R. Kelley, E. L. Lomax, J. S. Tebbets, C. F. Ressequile and M. S. Lindsay. The capital stock is $2,000. The nature of the business is the dissemination of advertisements by, and giving of entertainments with, phonographic appliances in connection with electricity.

Nevada, Miss.—The Parrish Electric Light, Power and Heat Company was formed last week. The capital stock of the company is $120,000. The stock is divided into shares of $100 each. The company propose to push the manufacture of the different inventions of Prof. T. J. Parrish at once. J. Sam. Brown was elected temporary president; Eugene Parrish, secretary; and S. A. Wight, Treasurer. T. J. Parrish, W. H. Robinson, M. E. Harrison, S. A. Wright, Eugene Parrish, C. E. Evans, J. Sam. Brown and J. W. Martin, were chosen directors.

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Topeka is likely to have, within a year, the largest electrical plant for the general distribution of power on the continent. Plans have been made for the construction of a dam across the Kansas (commonly known as the Kaw) river, and the utilization of the power thereby developed in the generation of electricity and its distribution to mills, electric roads, electric light plants and other power users throughout the city. The engineers in charge estimate that they can develop 10,000 horse-power, and that they will be ready to supply it by June 1, 1891. They propose to furnish it at the rate of $30 per horse power per annum, and nearly 3,000 horse-power have already been subscribed for by power users of Topeka, the city subscribing for 500 with which to run its own electric light plant. Among other benefits to accrue from this enterprise will be the ability to dispense with most of the present steam plants and the consequent elimination of the smoke nuisance.

The delegate for the Spanish Colonies has been particularly active at the International Telegraph Conference. He has secured from the West India and Panama and Cuba Submarine Telegraph Companies the concession of charging half rates only for press messages exchanged between Cuba and Spain. Another proposition from the same source was lost by only a very small number of votes, and telegraphists in almost all parts of the world will regret it, as the measure proposed was that double rates should be charged on all messages presented at a telegraph station between the hours of midnight and seven A. M., the additional charge to become the property of the sending operator.

Some curious electrical phenomena were recently noticed at an Italian stearine factory. At the establishment in question, a substance called ceresine, which is obtained by a special treatment of ozokerite, is manufactured, and while four vessels, each containing 500 kilograms of this material, were being cooled off, an accident to the electric light machinery caused the shop to be left in sudden darkness. To the astonishment of the workmen, the masses of ceresine were observed to emit pale blue sparks at every movement of the containing vessels. On approaching the hand to them, sharp sparks 50 to 60 millimetres long were obtained. These phenomena continued until the ceresine was completely solidified.

An incident which marred the success of a ball given in a French town, one night last month, although peculiar and perhaps unique, afforded a vivid example of the dangers of illuminating gas, and is offered for the benefit of those who are so fond of compiling statistics referring to the "dangers" of electricity. While dancing was proceeding merrily at the entertainment mentioned, the central chandelier of the ball-room fell to the floor and the gas became ignited at the socket, a huge flame belching out into the room. There was, of course, a sudden panic among the dancers, and in the rush for the doors two ladies were killed and 16 others seriously injured. No such untoward accident as this has ever been credited to electricity; on the other hand, no safer means of lighting buildings where large numbers of people are congregated can be found than those furnished by the electric current.

MODERN GREECE.

Athens, Greece, now boasts of possessing the largest electric light plant in Eastern Europe. A central station has recently been established there containing two 150 horse-power engines, and four smaller ones of 35 horse-power each, and eight dynamos, four of which have a capacity of 550 amperes each, two of 360, and two of 240. The dynamos were manufactured at the shops of the Edison Continental Company, at Ivry.

The current is distributed by underground cables on the three-wire system at a pressure of 110 volts, Edison incandescent lamps being used. The king's palace, the chamber of deputies, the national bureau of printing, and most of the large hotels, restaurants and printing establishments are already provided with the electric light, and new installations are rapidly being put in.

A large business is also done in current for motive power, principally among the printing houses, there being at present no less than 35 presses in Athens which are run by electricity. Small motors are also used for pumps, ventilators and bakers' kneading troughs.

The electric light was first introduced into Athens in 1888, at the time of the Greek National Exposition, and the natives were so impressed with its many advantages that a demand for installations quickly arose. Small stations with portable engines were hastily put up, and the light gave such excellent results in the hotels and theatres, which were the first customers, that it became necessary to build the present large station, which is said to be not only the largest of its kind in Eastern Europe, but one of the biggest industrial establishments in the whole of Greece.

SUBMARINE CABLE CROSSINGS.

The decision recently handed down by Judge Brown, of the United States District Court, in counter libel suits brought by the Western Union Telegraph Company and the Inman Line Steamship Company, is of interest to all companies owning submarine cables which cross rivers at points where there is any possibility of their being disturbed by the movements of vessels. It appears that the propeller of a steamship became entangled with some of the Western Union cables landing at the Netherlands Steamship Company's dock, at Jersey City; twelve cables were broken, and the devastating vessel had to be dry-docked to clear away the remnants from the propeller. The steamship company claimed $2,000 damages and the Western Union over $60,000, and the former won the day. On behalf of the telegraph company it was claimed that they had exclusive right to the silt or mud as a resting place for the cables, and that the propeller caught up the cables from the yielding embraces of the mud in which they were imbedded. Judge Brown decided that no such right is upheld in the Act of Congress relating to submerged telegraph cables; the act permits cables to "go under water, but not so as to obstruct navigation." Nothing in the act, he asserts, gives any absolute right to lay cables in all cases on the very top even of solid bottom. "There can be," concludes this remarkable decision, "no practical difficulty in sinking cables so deeply as not to possibly interfere with the movements of vessels in any and all emergencies of navigation. The use by steamers in the harbor of the undefined margin of silt or mud between the solid bottom and clear water is necessary. Every inch that can be utilized is needed, and should be scrupulously reserved for the uses of navigation, against all unnecessary interference."

It behooves telegraph and telephone companies to be very careful in selecting landing places for their cables if steamships are to be upheld in grappling for them and lifting them off the bottom, by means of the propeller. Judge Brown's idea of digging a subaqueous trench in the solid bottom is novel and would doubtlessly serve the purpose of frustrating the attack of any mud scraping propeller, but it is scarcely practicable, notwithstanding his *dictum* that there can be no "practical difficulty" in it. Instead of attempting any such heroic remedies, the better plan would be to avoid laying down cables directly alongside docks where ocean steamers are continually being berthed, which, it must be confessed, is a risky situation, likely at any time to be the scene of a similar accident to that already recorded.

At the same time, Judge Brown shows by his generous remarks about the rights of steamers to plow through all the silt and mud that they can find, that he is no obstructionist as far as navigation is concerned; he evidently recognizes that New York harbor is being filled up with refuse and allows steamships to make the best use they can of it, impartially deciding that they are at perfect liberty to ground themselves and the telegraph wires as much as they like.

Many paragraphs have recently appeared in the daily papers about a method of producing electricity directly from heat. The inventor is Harry B. Cox. Mr. Cox resided in Hamilton County, Ohio, until two years ago, when he moved to New Haven, Conn. He pursued his investigations at Fern Bank, and worked in an isolated work shop, in which he rarely received a visitor. He is a Zanesville, Ohio, boy, and was a second cousin of the late Sunset Cox. Electricians generally are disposed to treat this news in a very conservative manner. A number of the first electricians of this and other countries have striven for similar results, but none have thus far succeeded. The consensus of opinion is that the problem is possible of solution, and Mr. Cox may have solved it. But we are inclined to withhold the expression of our opinion until some tangible proof is presented to substantiate Mr. Cox's claims.

CORRESPONDENCE.

Electrical Happenings in Boston, Chicago and Indianapolis.

OUR BOSTON LETTER.

The Gethins Gravity Battery has had an extensive sale throughout the country. Many are being used for re-charging storage batteries.

The New England Printing Telegraph Company, of this city, has secured permission to erect poles and string wires through the city of Providence.

Simons' Cafe, No. 6 Oliver street, this city, has been fitted up with electric lights and electric fans. This is one of the most popular restaurants in Boston, and is a favorite luncheon resort with the electrical people of this city.

Messrs. Claflin & Kimball, agents for this section of the Mather Electric Company and Perkins Lamp Company, have taken the New England agency for the Easton Electric Company, of Newark, N. J.

Stoneham, Mass.—Electric lights have again been turned on in Stoneham after over a month of darkness, owing to a disagreement on the renewal of the contract between the selectmen and the Woburn Electric Light Company. A contract has been made for a year at $3,000, the matter being settled by a compromise.

Consolidation.—It is authentically reported that the Middleboro Electric Light and Power Company and the Middleboro Gas and Electric Company have consolidated, and Mr. W. A. Carey, of the Thomson-Houston Electric Company, appointed manager of the joint enterprises, which will continue business under the name of the company first mentioned.

Lynn, Mass.—The A. L. Hallbauer Electrical Supply Company, of the above named city, manufacture a novel and meritorious supporting device for trolley wires. The device is simple in form and easily handled. It clamps readily to the wire; soldering not necessary.

"Climax" Tape, manufactured by the Boston Rubber Shoe Company, is an insulating waterproof covering for protecting joints and other exposed parts of telegraph, telephone or electric light wires. Many leading electrical companies used large quantities of the "Climax" tape, and pronounce it reliable, durable and reasonable in price.

Washburn & Moen Company, of Worcester, Mass., will build a branch plant in or near Chicago. Mr. C. G. Washburn to-day confirmed the report of his company taking steps as above stated by saying: "The constantly increasing business of the Washburn & Moen Company in the West has led to the purchase of about 50 acres of land in South Chicago, where a mill for the manufacture of coarse wires will be erected immediately. It is not anticipated, however, that this action will permanently diminish the volume of the business done in Worcester."

The Insurance Agency of Stephen E. Barton, at No. 85 Water street, this city, should receive the patronage of the entire electrical fraternity of New England. Mr. Barton has issued a circular to his old friends and customers, in which he sets forth: "I beg to announce that Capt. Wm. Brophy and myself are prepared to place insurance on all kinds of property in first-class companies, represented at this agency. Manufacturing property and electric stations eligible to the Electric Mutual Insurance Company, will be placed in that company. All other risks that may be offered us will be placed in other companies."

The American Circular Loom Company, of this city, has just issued a neat little pamphlet containing price list of its patent woven-covered insulated wires and cables. The pamphlet contains also a table showing the difference between wire gauges, together with other useful information.

Mr. R. T. White, of this city, patentee and manufacturer of material for street railway roadbeds, has received an order for 80,000 of the White "Daisy" chair to complete the new extension roadbed of the Essex Passenger Railway, at Newark, N. J.

The Electric Mutual Insurance Company has issued a circular to its members giving notification of a special meeting, which will be held at its office, No. 85 Water street, Boston, on Tuesday, July 15th, at 12 o'clock. The object of the above meeting is to choose five additional directors outside of Massachusetts. The law did not permit this to be done when the company was organized, but it is proper and desirable to do so at this time.

Electric Stocks.—Boston quotations, at closing hour of the Exchange, Saturday, July 12, were as follows:

Thomson-Houston Electric Co.	56.
" " Preferred	96.
" " Series C.	13.
" " Series D	7¼.
Thomson Electric Welding Co	225.
" European Welding Co	107.
Westinghouse Electric Co.	40.
Fort Wayne Electric Co.	123/8.
Eastern Electric Cable Co.	70.
" " preferred	52.
Gethins Electrical Manufacturing Co.	2¼.
Union Electric Car Co.	5¼.
Electrical Safety Co.	1.
Western Union	84.
TELEPHONE:	
American Bell	229.
Erie	49¼.
New England	54.
Mexican	1.
Tropical American	1.50

Boston, July 12, 1890. W. I. B.

OUR CHICAGO LETTER.

Work is Rapidly Progressing on the mammoth electric fountain which is under construction in Lincoln Park. Hundreds of visitors each day are watching the work on this fountain which, when completed, will be one of the most interesting features of the park. The site selected for this electrical display is particularly suited for it, as it can be seen from quite a distance through the park and from far out in Lake Michigan.

A Suit is at Present in the circuit court at Milwaukee, commenced by William E. Shaffer against A. M. Bailey, George P. Knowles, Jr., B. Stern, M. H. Brand and S. H. Seamans, for the recovery of $46,750. The complaint recites that the plaintiff is the holder of a patent on an automatic fire alarm apparatus. He sold the right of manufacturing the apparatus to the Automatic Fire Service Company, and received in return a number of shares and a royalty on every apparatus manufactured, and he alleges that the defendants in this suit conspired to "freeze him out," by publishing false statements as to the value of the patent, by refusing to manufacture them, and by threatening to prevent him by injunction from disposing of his stock to third parties.

The Central Electric Company have lately added to their handsome offices a large solid carved oak sample case, for the display of the finer classes of goods.

The Many Friends of City Electrician Professor Barrett are circulating a petition addressed to the directors of the World's Columbian Exposition, asking that the Professor be appointed superintendent of the electrical department of the Exposition. The petition already contains a large number of names of Chicago's most prominent electrical men. Professor Barrett is a gentleman well known to the electrical fraternity, and is a thorough and practical electrical engineer. As for credentials, none are better than the fact of his having had control of the electrical matters of Chicago for the past 20 years, together with their present condition.

Alex. H. Lewis, who for the past two years has represented the "C. & C." Motor Company in and about Chicago, has resigned, and has accepted a position with the General Edison Company. The many friends of Mr. Lewis will be glad to learn of his change for the better, and also that he will still remain in Chicago, holding forth at the Rialto Building.

Edward Kohler, western manager of the Eddy Manufacturing Company, has recently closed a contract for one-half and one quarter horse-power Eddy motors for the National Bank of Illinois.

L. W. Collins, who for the past year has filled the position as manager for the Chicago Electric Club, has resigned and will accept a position as general agent for the "Electricians' Time Company."

Personal.—Frank Rae, of Detroit, Mich., was a recent visitor in the city.—Chas. Rusling, representing the Thomson-Houston Company in Kansas City, Mo., paid this city a flying visit this week.

The River and Bridge Lights were greatly appreciated by the police and firemen while fighting the fire and saving the lives of the stevedores at the terrible explosion and fire on board the steamship "Tioga," on Friday night. D. B. D.

Chicago, July 12.

The Elizabeth, N. J., Passenger Railway Company recently filed a transfer of its property and rolling stock and the various railroads operated by it in Union and Essex counties, to the Newark Passenger Railway Company, for the sum of $1,000,000.

The City Street Railway Committee, of Ottawa, Can., has received an offer from ex-Mayor Howland, of Toronto, to construct and operate an electric street railway by the Imperial Trust Association. The capital is to be $250,000. The main line is to be completed by June 15, 1891. The offer is dependent on securing water power.

Mr. Thomas G. Smith, Jr., late of Cincinnati, O., has been admitted to partnership in the firm of Charles R. Vincent & Company, New York. Mr. Smith was formerly identified with the Ball engine in Cincinnati. He is a member of the Society of Mechanical Engineers, and having been with Messrs. Vincent & Company for some time, is already familiar with the requirements of their business as consulting and contracting engineers.

OUR WASHINGTON CORRESPONDENT ON THE WING.

ELECTRICAL NEWS AND GOSSIP AT INDIANAPOLIS AND PERU, IND.—EXTENSIVE RAILWAY BUILDING—THE TELEPHONE SITUATION—TELEGRAPH REMINISCENCES.

INDIANAPOLIS, IND.

The Event of the Day in this city is the opening of the first electric street car line, and a large number of the citizens celebrated Independence Day by riding on the cars. Over 15,000 passengers were carried on the Fourth, and on the Sunday following, the number reached 13,000. The daily average of passengers carried since the cars commenced running, June 18th, is 8,000. The railroad company has purchased a large tract of land at the suburban terminal of the road and opened it for a public park, and the swift-running trains are loaded with people resorting thither. The road is seven miles long. It is equipped with ten motor cars, with the St. Louis improved truck, and two 15 horse-power motors each, which are calculated to draw two trailers, making a train with seating capacity for 125 passengers.

Through the principal portion of the city the center-pole construction is used, carrying the lines four miles from the station. The suburban portion of the lines are supported by wooden poles at the sides of the street. Two No. 0 copper wires supplement the rail circuit for a distance of four miles—beyond that distance no wire is laid. The power station is provided with one 500 horse-power Hazelton boiler; one 250 horse-power Corliss engine, manufactured by the Wheeler Engine Company, and two 80 horse-power generators. Natural gases in the fuel are being used, but the furnaces are so arranged that coal can be substituted at short notice and cars from any steam railroad entering the city can be run into the boiler room. Every portion of the entire plant bears the clear impress of the skillful engineering and durable construction which characterize the work of the Thomson-Houston Company. Mr. Benjamin Willard represents the company in charge of the road during its trial period. The road is the best one yet built by the Thomson-Houston Company. "Quite as good, if not a little better than the Eckington Road, at Washington," is what the city papers say of it. The extraordinary travel will necessitate an immediate increase of the power plant and an additional generator will be put up within the next two weeks. The railway company has 70 miles of road, nearly all of the lines diverging from a common center at the power station, where it owns one acre of ground and has unlimited facilities for extending the plant. Its architect is preparing plans for a building with room for twenty-one 80 horse-power generators, and it is expected that the whole road will be changed from horse power to electric power as rapidly as practicable.

The Question of Interference with Telephone Lines has not proved a serious one in this case. The company's charter requires it to construct its lines so as not to interfere with existing lines, and it is believed that this single trolley system, as operated here, will meet this requirement. The telephone officials say that, although some of their heaviest lines run parallel with the railroad wires and on the same street, no particular trouble has arisen. Experience with this and similar cases points to the conclusion that the damaging effect on telephone lines is much less from a single trolley line when the rail circuit is supplemented with a return wire of liberal conducting capacity, than from a line in which the rails alone are depended on for return circuit.

The Indiana Division of the Central Union Telephone Company, under the management of J. E. Hockett, is rapidly recovering from its tussle with State politics and legislation, and is devoting its energies to the legitimate task of furnishing good service to its patrons and earning dividends for its stockholders. Overhead wires hold their own, but some underground work is being done jointly by the two lighting companies operating the Brush arc system and the Thomson-Houston direct current incandescent system, respectively. Common terra cotta sewer pipes are laid in gravel with drawing-in manholes at convenient distances. The Thomson-Houston station, located on the circle in the center of the city, and in close proximity to the swell club house, is as tidy and dainty as a millinery shop, a condition rendered possible by the use of natural gas. This company is required to run all its wires underground within one square mile, of which the station is the center; outside of that territory it may use overhead lines. It is understood that the company is about to adopt the three-wire system of construction. The Brush Company is putting into use, for operating fans, etc., a large number of its own motors working on 2,900 volt currents. It does not allow outside parties to attach motors to its wires. A few unused electric light towers ornament the public squares, and they serve the purpose better than some of the statues recently erected in the same neighborhood. The towers were put up some years ago by a private citizen, who did not succeed in having them adopted by the city.

Mr. Chas. D Jenney, manager of the Jenney Electric Motor Company, is crowding his present factory to its full capacity without being able to keep up with his orders for motors, and is fitting up a much larger place with new machinery and tools for the manufacture of motors, dynamos and other electric appliances.

One of the Prominent Citizens and main supports of Indianapolis is J. F. Wallick, superintendent of the Western Union Telegraph Company, who has been in this office for the last 38 years. He and General Eckert labored together over the same Morse register, at Wooster, Ohio, in the early days of dots and dashes. In 1864–5, Edison spent some time in this city, earning $75 per month. The manager sent him to the depot office, having come to the conclusion, after examining Tom's qualifications, that he "would do for a railroad operator."

And it Was not so Many Years before that time that the Hoosiers did not believe in telegraphs at all. In 1842, David Wallace, the father of Gen. Lew Wallace, was defeated in the Congressional campaign in this district, for the reason that, while he was a member of Congress the previous session, he voted in favor of an appropriation to enable the government to aid Morse in testing and establishing his telegraphic invention. G. C. M.

Indianapolis, July 7, 1890.

PERU, IND.

The Freedom of the City, with free gas and a liberal allowance of silver dollars, is what this enterprising city offers to electrical manufacturers. It is especially desirous of encouraging the introduction of this class of business into its territory, and will give all land required for the use of factories, a supply of natural gas for five years, and will make a contribution in money to any electrical company which will settle here. Mr. R. A. Edwards, cashier of the First National Bank, is the member of the Board of Trade who has charge of this business. The Findlay Glass and Carbon Company is moving its factory to this place.

Peru, Ind., July 8, 1890. G. C. M.

First Up and Then Down.

A Cleveland syndicate which paid $250,000 for the street railroads of Columbus, Ohio, asked the city council to extend its charter for 40 years. The council passed the ordinance, granting the extension. An indignation meeting followed, and the council had another meeting, and unanimously repealed the ordinance.

Conduit Electric Railways.

The overhead trolley wire is serving an admirable purpose in demonstrating the gratifying success with which electrical energy can be hitched up to a street car, to the eternal shame of even the best behaved mule, but the time will come, we think, when railway managers will have been educated to the faith that a thoroughly constructed permanent conduit will fully justify the high cost of its construction. It can be done, and it will, sooner or later.

The Lineff Underground Conductor Electric Tramway.

We had an opportunity of examining the Lineff electrical tramcar, at Chiswick, on the 25th inst., says the editor of London *Industries*. Mr. Lineff has dispensed with the slot in the roadway which was employed in his former system, and has modified the car and the track on which he experimented some two years ago to exhibit his electro-magnetic system of completing the electric circuit. The conductor is laid in a closed conduit a few inches below the level of the road, and lying loose above it are a series of loose strips of galvanized iron. Iron rails, also galvanized, form the top of this conduit, and a powerful electro-magnet carried beneath the car picks up these strips, and thus makes connection between the conductor and the rail.

Telephonic News

*** The wires of the new telephone line from Camden, Ala., *via* Canton to Rehoboth, are now being erected, and in a few days these cities will be in direct telephonic communication with Selma.

*** A new telephone line will soon be constructed connecting West Lebanon, Pa., Elder's Ridge and Louisville with Clarksburg, Indiana County, and from this latter place to Livermore. The money to build the line has all been subscribed, and it will be pushed through. It will prove a great convenience.

*** The International Bell Telephone Company has declared a dividend of three per cent. for the half-year, payable July 1. The company offers to buy $50,000 of its own stock at not exceeding par, from the proceeds of the redemption in cash of its holding of founders' shares in the Nederland Bell Telephone Company, of Holland.

*** The telephone system in Scotland has been extended by the establishment of a direct line between Edinburgh and Dundee. This line will be shortened at an early date by the running of a line across the Forth Bridge. The National Telephone Company have also established a trunk line from Edinburgh to Galashiels, Selkirk and Hawick, and have just increased the number of trunk lines between Edinburgh and Glasgow by two additional lines. The revenue of the company, says a London exchange, now reaches the large sum of £400,000 per annum.

American Names for Electrical Units.

At the regular monthly meeting of the American Institute of Electrical Engineers, held June 17, 1890, the following resolution, recommended by the council, was introduced by Mr. Francis B. Crocker, with the request that it be taken up for action at the next meeting of the Institute, in September.

Whereas, It has been the custom in the nomenclature of electrical units, to perpetuate the names of men who have contributed most to electrical science, and

Whereas, In the names thus far adopted the eminent services of Americans have not been recognized; therefore,

Resolved, That in the opinion of the American Institute of Electrical Engineers, a just distribution of the honors thus far bestowed necessitates a recognition of the splendid contributions to electrical science of one or both of America's great electricians, Benjamin Franklin and Joseph Henry; and

Resolved, That this Institute will gladly co-operate with other bodies in this country and abroad to secure the general adoption of these names for electrical units; and

Resolved, That the name of Henry should be given to the practical unit of self-induction, since he was the discoverer and greatest investigator of this phenomenon, and because this unit at the present time is called a quadrant, which is merely a numerical value and not a suitable name.

Resolved, That this Institute recommend to electrical societies and electrical engineers the general use of the name of Henry for the unit of induction, as being the quickest and surest way to secure its final adoption.

It is unfortunate that the name of Henry for the unit of induction was not adopted at the Paris Electric Congress of 1889. If the attention of the Congress had been forcibly called to the fact that Henry discovered self-induction, and that his work on both self and mutual induction was of the greatest importance, his name would probably have been adopted then. Henry's discovery of self-induction which is, of course, the fact that gives the strongest claim, was made in 1832 and published the same year in *Silliman's Journal*. In this paper he describes experiments showing that the spark obtained by breaking a circuit composed of battery and a long wire is greater than with a short wire, and that the spark is further increased by coiling the wire. He then clearly states that the phenomenon is due to the action of the current on itself, all of what is perfectly correct, and would be a good statement of the facts even at the present time.

Charley Selden as a Temperance Reformer.

They tell a story out Cincinnati way to the effect that, somewhere back in the '60s, when Selden, the well-known Balt. and Ohio Telegraph superintendent, was a rattling press operator in the Western Union office and W. was night chief, the latter had a habit of leaving Charley in charge of the office and going out for a few hours every evening to transact "some business at the newspaper offices." After these visits, W. always came back much fatigued and, seating himself in a big arm chair, with his legs across a table, would sleep soundly till closing time. Selden's philanthropic desires and ingenious turn of mind soon led him to consider some means of rescuing his superior officer from his dangerous tendencies. A plan was soon developed and put into execution. The office was furnished with the old-fashioned operating tables, which had heavy, hinged lids. The next time W. got comfortably settled in his dreams, Selden posted the operators so that each man could raise two of the table lids and, at a given signal, they let them fall with a bang that shook the whole neighborhood. Every man quietly took his seat and, when the old man jumped to his feet with sudden fright, they looked up in innocent astonishment and went on with their work. W. looked around, rubbed his eyes and walked out into the battery room. When Selden followed him, a little later, he had his head under the water spigot, trying to cool off and recover his senses. Precisely the same programme was carried out the next night, and the next. The third time, W. called Selden one side and asked, "Did anybody fire a gun just now?" "No," said Selden. "Wasn't there a cannon fired from Newport Barracks?" "No." "Wasn't there some loud noise in the street?" "I heard nothing," replied Selden. And then, as the horrible conviction that the *jim jams* had got him at last forced itself upon W., he said, solemnly, "Charley, I have been up so much nights with my sick wife lately that I am really getting nervous. I'll go and see a doctor to-morrow." He consulted a physician, and his account of his symptoms brought such a frightful diagnosis from the medical gentleman that W. swore off and never drank a drop again.

Telephonic Communication from Each Electric Car.

Superintendent William H. Cull, of the Albany Electric Railway Company, is about to introduce a new and novel feature in the working service of his railway system. By placing a telephone or some other electrical device in each car, so connected with the trolley that in the event of a car being disabled or detained by obstructions on the track, the conductor can establish communication between the car and the superintendent's office, simply by changing the trolley from the trolley wire to the guard wire. The guard wire will be connected with an electric apparatus at the company's office. Mr. Cull says the plan is perfectly practicable, and will add greatly to keeping the cars on schedule time.

Merciful Street Car Motors.

We can most of us recollect when a horse that had done service enough to retire on a dependent pension, was thought good enough to be hitched to a cumbrous stage and whacked through the streets of Boston and New York, till his rickety old bones would carry him no longer. With the advent of street cars, a better class of horses was substituted, until now the car companies buy the best horses that can be procured, and take the very best care of them.

But with all this, the sufferings of the poor beasts on very hot days are painful to sensitive people; and many of them show plainly that their feet, the horse's weakest point in street car service, are in great pain.

In view of these things, those persons who are opposed to rapid transit by electricity until some better motive power can be produced, are singularly obtuse. The prophecy is now recorded that within ten years not a single car on the streets of our cities will be drawn by horses. We doubt not that the bulk of progressive citizens would be glad to see the prophecy fulfilled in half the time.—*Boston Globe.*

Telegraphic Transmission.

To the Editor of Electrical Review:

In the present advanced state of the electrical arts, much that is of value consists in the improvement of minutiæ, the perfections of the details of existing devices, rather than the creation of radically new systems. As the highest state of development is attained by the gradual and equal growth of all the members, so also shall we attain the "*excelsis*" in every art by the study and improvement of trifles.

To one unfamiliar with the details of telegraphy, little can be realized of the thought and care that have to be expended in working telegraph lines. Every step must be planned and perfected. All the parts must be in harmony or the balance will not be preserved. At the outset the first difficulty is found in the sending instrument, technically the "key." It is not my purpose to go beyond this point but merely to detail some of the considerations which are of vital importance in the key.

The object of a good key is to permit fast sending with least fatigue. Continued use of the key, will, as is well known, produce in the hand a certain paralysis akin to what is known as writer's cramp. It is to meet these requirements that so many keys have been devised, thus, as in all else, is necessity the mother of invention.

In the arts as disclosed by the publications and patents, it appears that few have attempted to produce an entirely new key, a device *sui generis*, but rather have the efforts been directed to the improvement of some of the essential parts. Putting aside keys for the transmission of alternate or reversed polarity currents, which are often of special construction, a key ordinarily consists of a lever and button, contact points operated by the lever springs to restore and maintain the lever in a detrimental position, a suspension for the lever and a switch to close the circuit when the key is not in use.

The importance of the mounting cannot be over-estimated, as much of the imperfect working of the key is due to the friction of the supporting surfaces. It is to the friction alone that the cramp is to be attributed. The usual form of mounting is by trunnions, brass pivots working in iron sockets, which are formed in standards mounted on or integral with the base of the key. Various other means are in use. One inventor describes a ring and ball bearing as a mounting for his lever. Others combine restoring spring and mounting, and mount the lever on a torsional spring.

Much depends upon the restoring spring itself; if it be not strong enough, the key movement will be slow and the operation uncertain, if too strong, fatigue will be occasioned. Various springs have been devised and located in suitable places to meet the varying demands of use. Some attention has been paid to the key lever by making it of different degrees of thickness, and by employing different materials. Steel, on account of its strength and lightness, is perhaps most used.

The contacts themselves come in for a large share of attention, for the reason that upon breaking the circuit a slight sticking is noticeable which affects the accuracy of the sending and also occasions fatigue. By reducing the areas of contact this can be obviated; conical contact points and sliding contacts are some of the means employed. Another device of this kind consists of disks with rounded edges placed at right angles to each other. The contact is thus narrowed down as nearly to a mathematical point as may be.

By far the bulk of the art consists of self-closing keys; that is, keys which, when transmission has ceased, will automatically close the circuit. This is ordinarily done by having a spring pressed lever of some kind attached to and operated by a movable secton of the button on the key. This lever bridges the contacts in some manner, usually by completing circuit between the key lever and the lower contact point. The reason for the use of this device is that the line is often left open by the carelessness of the operator, and communication is stopped. Continuity-preserving keys, properly so-called, are for use only in duplex and quadruplex telegraphy; double transmission requires a continuous path to ground at all times. These keys are arranged with double sets of contact points and springs bearing on them, so that there is at all times a continuous path to ground, either through the instrument or a separate wire. The battery may be in either or both of these branches.

Other varieties of keys, for various purposes, send currents of alternate polarity to line, or actuate rheotomes to send rapid makes and breaks. In each of these many considerations must be taken into account, largely analogous to the simple keys; what applies to one *genus* may be considered to apply to all.

The importance of a good key, therefore, is great as it affects not only the rapidity of sending but also the style, and will ultimately tell less upon the hand that uses it as compared with the effect of less perfect keys.

But what is perhaps strangest is that the best keys are purely American. In this particular, America leads.

The usually ingenious foreigner is either infertile in this regard, or he has ignored it entirely, while Yankee acuteness seems to have grasped the value of working out details. There is as much promise of profit in a good key as there is in a good system, while the expenditure of thought may be less for the former than for the latter. It may be taken as a true indication of genius that a man looks carefully after the small things. Angelo's saying, that "trifles make perfection," is equally good in our profession as in his own. G. Ev. M.

Washington, D. C., July 1, 1890.

A Disagreement in Subway Circles.

The North American Underground Telegraph and Electric Company has brought suit in the Supreme Court for $2,500,000 damages against the Consolidated Telegraph and Electrical Subway Company, for the failure of the latter company to use a patent system of conduits owned by the plaintiff, and to enforce an alleged contract to use them. It is alleged in the complaint that, when the wires were ordered underground, the defendant corporation was formed and entered into an agreement with the Subway Commission to build the subways. Then, it is claimed, in March, 1888, the defendant entered into a sealed agreement with the plaintiff for the use and operation of the system which the plaintiff controlled, the plaintiff thereupon selling to the defendant the exclusive license to use in New York the plaintiff's patents. It is alleged that the use of the plaintiff's system was agreed on, and that in pursuance of one term of the covenant William H. Johnstone, the vice-president of the plaintiff corporation, was elected a director of the defendant company.

The latter company built and operated a number of miles of subways on this system, and then, without notice to the plaintiff, suspended this work, though the subways laid were and are still in successful operation, it is claimed. This stoppage and the adoption of another system, the plaintiff alleges, were due to the Western Union Telegraph Company and the American Bell Telephone Company. The complaint alleges that the Western Union and the Bell Company, having vast interests in overhead wires, were opposed to any effective system of subways, and so shut down on the plaintiff's system and began laying worthless and impracticable conduits.

The complaint has been served upon Theodore N. Vail, the President of the Subway Company, and upon D. Morgan Hildreth, Jr., President of the New York Underground Telegraph Company, which is joined as a defendant because, holding certain franchises, it became a party to the alleged agreement with the plaintiff.

Mr. Edward Lauterbach, the attorney of the Subway Company, said to a reporter that he had casually examined the papers, but they hadn't interested him. "We gave up that system of conduits," he said, "because we found a better conduit. We act under the advice of the electrical experts of the city. Our contract with the North American Company permits us to use their system at our pleasure. We were at liberty to stop using it when we saw fit to do so, and we are free to resume it if necessary. As to the idea that the Western Union Company doesn't want the subway system to besuccessful, that is not worthy of serious consideration. The Western Union Company has most of its wires on the elevated railroad structure, and is not bothered much with the subway question, although I think it approves subways."

The Operators' Future.

HOW THEY DESERT THE KEY AT THE FIRST OPPORTUNITY.

One-third of the telegraph operators of the country are continually preparing themselves for other professions, while the other two thirds are continually thinking of doing so, says a writer in the New York *Sun*. Of the 100 men working on the regular night force in the Western Union main office at 195 Broadway, 36 of them are either studying or working at something else, days. They are divided up as follows: Doctors, 8; lawyers, 6; ministers, 3; brokers, 3; actors, 2; theatrical managers, 2; real estate dealers, 2; inventors, 2; book agents, 1; manufacturers, 1; civil engineers, 1; authors, 1; commercial business, 1; electrical supply agents, 1; composer of music, 1. This represents only one office. The offices of the various other companies in this city have just as large a list in proportion to the men they employ, while those of other cities are also numbered in what is called the progressive procession.

This evolutionary business has been going on for years, and scores of prominent men in all branches of business and in all professions can be traced back to the telegraph ranks. Among them are Andrew Carnegie, ex-Governor Cornell, Thomas A. Edison and George Kennan, the Siberian traveler. The fever didn't become general, however, until about 20 years ago, when ex-Governor Cornell, at the unveiling of the statue of Professor Morse, in Central Park, spoke slightingly of the future of the business, and advised all operators to get into something else as soon as possible. Since then there has been a veritable stampede.

The method of making the change is different from that employed by men in other walks of life. Operators never have fat places thrust upon them. This is because they never come in contact with leaders in the business world. So if they ever expect to get anything better they must reach for it. Most of the operators who desire a change are men of families, consequently they have to move discreetly and do considerable economical juggling. Being without any capital except their own energy and ambition, they choose a profession. The two most in favor are medicine and law. The next thing to be done is to acquire it. But this isn't such an easy matter.

The only thing in their favor is their hours of duty. These are regular. Telegraph offices have three separate forces. The day force reports for duty at 8 A. M., and is off at 5.30 P. M., the regular night force relieves the day force at that hour. The all night force relieves the night force at 1.30 A. M., and is in turn relieved at 8 by the day force again. The regular night force is the most available, and the small army of aspirants for greatness in other ranks struggle upon it. They are given no extra privileges by the companies, but are subjected to the same stringent rules and regulations that govern the rest of the men. In fact, they have a harder time of it than the majority of the operators, because they are ordinarily strictly first-class, and are, consequently, compelled to do the hardest work.

This studious corps has learned the art of condensing time, and the method of one is the method of all. The case of W. M. H. McEnroe, M.D, assistant to the chair of *Materia Medica* and lecturer on diseases of the nervous system, at the University of the City of New York, can be cited as an illustration, although he is no longer connected with the telegraph company. Dr. McEnroe was probably the first operator to break away from the ranks in this city and wrestle with a three years' course of medicine. He entered the University of the City of New York in 1880, while employed as an operator at 195 Broadway. After he had become a doctor, he still continued to be an operator until he had built up a substantial practice. He ceased to rattle a key about three years ago. Dr. McEnroe was a member of the night force. But instead of going to work at 5.30, when the regular force did, he went on half an hour earlier. Each operator is allowed 30 minutes to lunch, but the doctor didn't go to lunch. In this way he saved an hour and was off every night at 12.30. He had to be at the college at 9 o'clock for the first lecture, and this necessitated his getting up at 8. At noon he was out, and, after a hasty lunch, he locked himself up in his room and plunged into his books, where he was buried until 4 o'clock, when he ate another hasty meal and went to work. This he kept up during each college year, and continued to work right on through the vacations. After he had secured his diploma and swung his sign, he still worked for the telegraph company nights, and waited days for the patients that came at last.

Another M. D., who is still actively engaged in the telegraphic profession, is Southern Wire Chief Halleck, also of 195 Broadway. He is a D. V. S., also. Dr. Halleck at first aspired to relieve horses of their pains. after he had graduated he changed his mind, and decided that he would rather relieve men. So he began all over again, and is now practicing. George W. Williams, one of the Western Union's star operators, was also made a doctor this Spring, but he hasn't decided yet where to begin operations. Both Dr. Halleck and he are married men and were when they began studying for the profession.

Of the prosperous lawyers who once worked at 195 Broadway, John B. Sabine is an example. For many years he was night Western chief, and one of the most popular men in the office. When the wires worked well he pondered over his Blackstone. He was admitted to the bar, and set up in business on lower Broadway. He continued to work nights, because he had to, for several years, until his practice would warrant his making the change. Operator Cameron, also of the Western Union, has just opened a law office on Broadway, too. But he hasn't quit the key yet. He first studied civil engineering. After devoting several years to it he discovered that that field was luxuriously covered. He decided to tackle the law next, and has just graduated from college.

In striking contrast to the men who are dabbling in medicine and law are the actors. To them telegraphy has been a gold mine on more occasions than one. Walter Perkins is one of the most successful on the stage. He is at present working at 195 Broadway, instead of walking on the Rialto. He has travelled with Maggie Mitchell, and has just closed a season with Gillett's "Held by the Enemy" company. Perkins had some remarkable experiences in his efforts to climb the stage. He was stranded in Texas on his first trip out, and it was then that he first fully appreciated his knowledge of telegraphy. Being a first-class operator he secured a situation in the Dallas, Texas, office. He worked there long enough to pay his fare to Kansas City, from there he drifted to St. Louis and then to Chicago, where he remained until he could patch up appearances and enter New York in a prosperous condition. After working hard in this city, he managed to save up a good sum, which he carried to Omaha and invested in a museum. That was the last he saw of it, and he again worked back to the East by degrees. After many similar failures his luck changed.

All these men who are striving to shake loose from telegraphy were originally country boys. The villages where they went to school, and where they afterward learned telegraphy grew too small for them, and they came to New York, where they could do better. Many countrymen, after spending several years in this city, enter colleges and graduate with honors. During the Summer vacations they return to the city and work day and night. In this way they make enough money to run them through the college year. Dozens of such men flock to the city every Summer after commencement and remain until the college opens in the Fall again. As the Summer season is the time when the telegraph companies do their biggest business, they don't have any trouble in getting all the work they want.

The number of telegraphers who drift into newspaper work is also large. There is scarcely a paper of any importance in this country that doesn't number several ex-telegraphers upon its staff. In New York there are a score or more. These men were usually employed by the various press associations and newspapers as operators.

Probably the only man engaged in the telegraph business who doesn't care to get out of it is John Brant, an operator at 195 Broadway. He is a banker on quite an extensive scale. For 20 years he has worked for the Western Union in this city and loaned money to the boys. The majority of operators have a way of spending their money long before pay days, which occur on the 1st and 15th of every month. Brant is their benefactor and his own. He loans them a certain sum, depending entirely upon who the person is, for two weeks at five per cent., without security. It is estimated that he loans $3,000 in this way a month, and he is said to have accumulated a considerable fortune.

The higher officials of the various companies are said to view the evolutionary movement with disfavor. This is not strange, for the men who are working out of the business are usually the companies' best men. The companies do not put any obstacles in the men's way, neither do they give them a helping hand. They consider that the men are using the telegraph as a stepping stone to something better, and they sprinkle just enough congealed water upon the steps to make them slippery. If the men mount them in safety they take it good naturedly; if the men slide to the bottom, they are satisfied. One official, when asked what aid the companies gave their men who desired to better their worldly condition, said:

"We give them no aid, because it wouldn't do. We look upon all our men alike and treat them all alike. The students are governed by the same rules that govern the other men. They have no privileges over any one else. If they want to get off before their time is up, they have to put their names in the early book and take their chances with the rest of the men. If we can spare them we let them go; if we can't, they have to work, no matter how tired or sleepy they may be. We hire them as operators, and all that we require of them is that they will do the work for which they were employed. If they want to attend college during the daytime they can. That's none of our business. But because they do isn't any reason why we should show any partiality. After they have secured their diploma, however, we usually arrange their hours in such a way that they can have the day to devote to working up a practice. But until then no concessions are made, and they are not even allowed to study in the office, even if they did have the time."

Notwithstanding the last statement, the men do study in the office. But they do it clandestinely. They carry a little volume about in their pockets, and whenever there is a lull in business they take it out and read its pages, which they screen with messages. The chiefs of the various divisions in which the men work know it, but never interfere. They are in sympathy with the men, and have a disposition to give them a lift whenever they can.

An Electrical Engraving Machine.

Among the electrical inventions recently patented, none are more interesting than an engraving machine, which is electrically controlled and operated.

This little machine appears something like a planer, and, like that machine, has a sliding bed on which the work is placed directly under the engraving tool, which is held in a crane neck.

This bed has a reciprocal motion under the engraving tool, and is operated by a lever, which, in reciprocating the bed for the work, also reciprocates a carrier upon which the copy is placed. Suspended over the carrier is a very delicate tracing point; this acts as a contact, and is insulated from the supporting mechanism, the carriage reciprocating moves under this tracing point, which touches the projecting surfaces of the metallic copy, which makes and breaks the circuit, at the same time the tracing point is automatically moved back at right angles to the direction in which the copy carriage moves, so that with each reciprocation of the carriage, the contact point moves over a different part of the original copy. The engraving tool is carried in a frame which moves back at right angles to the direction the bed moves in, keeping a pace with the rear work movement of the tracing point, and, as the circuit is opened and closed by the action of the tracing needle, the tool controlled by the action of a magnet in the circuit. This machine by suitable attachments, will engrave equally well on a concave or convex surface as on a level surface, and in the latter may be in a straight line, in a circle or in irregular curves.

To show the value of this machine, we will suppose that a silver tea service is purchased as a wedding present, and the purchaser requests that a monogram be engraved on each article, the engraver can sit down and on one piece engrave the desired monogram, placing this copy under the tracing needle, and starting the machine he may reproduce the monogram exactly like the original on each of the articles, no matter if there be a hundred.

The Advantage of Tempered Copper.

The tempered copper manufactured by the Eureka Tempered Copper Company, of North East, Pa., has passed beyond the experimental stage as regards its use for commutators and electrical brushes. It has been tried by all the large manufacturers of electric light and power dynamos and by at least one-half of the central stations of the United States, under a positive guarantee of three times the wear of copper or bronze, whether castings or drop forgings.

In the face of this large trade, under this guarantee, in no instance, we are informed, has any goods ever furnished for electrical work by this firm been returned or payment refused. For street car work it is especially adapted for gear pinions, as well as commutator segments and trolley wheels or trolley wire. They also make a gear pinion of alternate sections of copper and raw hide that has been used successfully upon several electrical railroads.

TELEGRAPHIC

.... The Canadian Government are doing away with the telegraph line between Qu'Appelle and Prince Albert, the operators having received notice to quit on August 31st. The line will be used as a telephone line.

.... The Postal Telegraph Cable Company has its line completed through Colorado Springs, Col., and laid as far as Littleton, within ten miles of Denver. This system connects with the lines throughout this country and Canada.

.... Messrs. Siemens and Halske, of Berlin, have recently patented a process for the electrical treatment of ores, of which the following are the principal points: The ore, first being pulverized, is put into a cylinder filled with a solution of sulphate of iron. The mixture is kept constantly in motion by means of moving pallets, and if there is need the bath is steam heated. If the process is used for amalgamation, cylinders of copper, partly plunged in mercury, are placed in vessels and set in a rotatory motion. This movement assures a constant contact between them and the mineral, and the reduction takes place. In a more general case, a solution of alkaline cyanide is added to the electrolyte, and an electric current is turned on. The metal is deposited on a cylinder of copper. After the operation, the copper is recovered by ordinary methods. This process will be applicable in the treatment of the ores of copper, zinc and precious metals.

AMONG OUR COUNTRY EXCHANGES.

The Effect of the Hot Spell.

Talk about the weather. The electric light dynamo blew up last night in spite of thunder. The thing "spit fire" for a few minutes in every direction.—*Clinton, Ia., Bugle.*

The Editor Hustled, but Couldn't Quite Get There without Light.

During the storm, lightning struck the power house and wrecked the incandescent system to the extent of about $3,000. The *Press* was greatly inconvenienced by the lights going out, which compelled us to hustle about the city looking for lamps. Our paper this morning is not what it would have been had we had plenty of light.—*Nebraska City Press.*

What Did Huntley Say?

Manager Huntley, of the Brush Electric Light Company, called on the Mayor this morning to explain the delay in getting the wires under ground.

"We cannot get the iron pipe fast enough," said Mr. Huntley, "but we are putting them in as fast as they come."

"Umph," said the Mayor.—*Buffalo Commercial.*

Darkness Knocked Out.

The foundation for the incandescent electric light station is nearly completed, and the brick work will soon be begun. When the plant is in operation, darkness will become a stranger to that locality.—*Meadville, Pa., Republican.*

Can Soon Sit in the Shade.

The city will soon be a veritable forest of electric light, telephone and telegraph poles, as they are being put up on every street.—*Butte, Mont., Mountain.*

Willing to Take all the Money.

The Geneva Brush Electric Light and Power Company have accepted the offer of the village to take all the money voted at the recent tax meeting and put up nine new lamps at the company's expense—*Rochester Union.*

* * The work on the electric railway in Brewer, Me., is progressing favorably, and the line will soon be finished. Poles are being set for the overhead wires.

* * The La Fayette Electrical Manufacturing Company, La Fayette, Ind., will start operations in a few days. The machinery is being placed in position ready for use.

* * An invention has been perfected of an entirely new underground system for operating electric street cars. A company with a capital of $600,000 has been formed at Atlantic, Ia., to push the merits of the invention.

* * The Oakland Manufacturing Company, of Gardiner, Me., which has taken the contract to furnish power for the electric railroad to be built this season between Augusta, Hallowell and Gardiner, Me., will soon start to build a new power station. The contract calls for 50 horse-power. Two 100 horse-power high speed engines will be installed. Thomson-Houston apparatus will be used.

* * The Thomson-Houston Electric Company has just issued a leaflet entitled the "Monthly Bulletin of the Railway Department," containing the names and sizes of all the roads in operation and process of construction using the company's system up to date. The back of the book is devoted to descriptions of lightning arresters, storage batteries and the foreign railway business of the Thomson-Houston International Electric Company.

The Westinghouse Street Car Motor.

The first electric street car motor of the manufacture of the Westinghouse Electric Company has now been in operation on the Pleasant Valley Electric Railway line, in Allegheny City, for some time, and the success of the machine is reported as being established beyond question, and a number of electricians and street car men, who have examined the motor, praise it highly.

The great strength of the apparatus and the excellent workmanship are very apparent. The Westinghouse Electric Company has already secured orders for the equipment of 17 street railways, aggregating a business of $300,000, although the company has only been soliciting orders during the months of May and June. From the very moment it became known that the Westinghouse Company had determined to manufacture street railway apparatus, orders and communications have been received from all parts of the country. The Westinghouse Company in the construction of its apparatus has carefully guarded against many difficulties that have heretofore been experienced, and has produced a form of apparatus that will enable it to supply a durable electric street railway motor.

The International Okonite Company.

The recent organization of this company, to purchase the Okonite Company, of this city, and a wire manufacturing company, of England, was recently noted in the columns of the REVIEW. The new company's shares, which were offered to the public, it is officially announced, have been completely subscribed, as well as the debenture bonds. Considering that the time for subscribing was only one day, this speaks volumes for the standing of the new company and the very valuable property it has secured.

Lag Screw Wrench.

The E. S. Greeley & Company, of this city, are introducing a new lag screw wrench, illustrated on this page, which is especially useful to telegraph, telephone and fire alarm workers. It is changeable, and can be used for various sizes by means of different sockets, and can be turned either way without taking the wrench out. For all overhead work and work in close places, it is particularly valuable, and is quite a saving in time and labor.

Insurance of Electric Plants.

TO THE EDITOR OF ELECTRICAL REVIEW:

Nothing for a long time has created quite so much stir and excitement with the stock fire insurance companies and their local agents as the advent of the Electric Mutual Insurance Company to insure electric plants.

Ever since the first plant was established these companies and agents have looked upon the risks as being very hazardous, and for the most part the companies have declined to insure them; not because there is any record to show by their having burned frequently that they were extra hazardous, but the same old "mysterious something" (and they knew not what) has made their judgment hide behind their fear. Of course, the agent has sought high and low for companies that would take the risks so that he might secure his 15 or 20 per cent. commission on the premiums. The hazard of the risk was nothing to him if he could "place" it at all; in fact, the supposed extra hazardousness has operated to his great advantage, because the greater the premiums, the more commission he realized.

Several companies, being willing to gamble on anything at a high rate, have all along accepted the risks, but by reason of there being but few takers, they have been enabled to secure very exorbitant rates. They have cried down the risks and raised their rates but they haven't refused any of the business, except to get a higher rate. As a result, they have made large profits. The rates have been made so high that few of the electric companies have felt able to carry more than a very small percentage of their value in insurance. As a consequence, when a small loss would occur it would result in nearly a total loss to the insurance companies under their policies. Then would go up the cry that not only were electric stations *very extra hazardous*, but the property was *very perishable*, and a small fire that wouldn't damage any other kind of machinery very much, would *ruin* dynamos and other electric apparatus. So that early in the game they began to discriminate against dynamos, and to apply the "co-insurance clause" to their policies. The latter clause is one which compels the property owner to have full insurance or become a contributor to his own loss, in the proportion that his insurance is less than the value of his property.

The condition of things has been growing worse rather than better. In many parts of the country, electric stations have been tariff rated by the insurance boards at figures ranging from two per cent. to four per cent.—almost as high as planing mills and other similar risks. The result of this rating has been to debar all "Board" companies from taking the risks at less rates, even if they were willing to do so. Another result of the tariff and of the small number of responsible companies that would accept such risks, has been the compelling of agents to secure policies in all sorts of shyster or irresponsible companies, because the high rates (presumed to have been made intelligently) have frightened the good companies to that degree that a sufficient number could not be found to carry the amount of insurance wanted. The agent's only recourse then, was to get policies where he could and at such rates as he could. If the names of companies carrying electric station risks at the present time could be made public it would probably disclose the poorest lot of companies, as a class, on any risk in the market; and if the rates could also be made public it would indicate the highest rated risks as a class. Under such circumstances, it is not strange that the electrical interests should welcome the advent of a company of their own, allied to no tariff organization and, therefore, free to act independently and intelligently, as well as being governed by a board of directors all of whom are electrical men. But how changed and varied is the attitude of the several underwriters' boards? In some instances, they get their heads together and say, "we will maintain our tariff rates on each station until we feel that the Electrical Mutual Company is after it, and then we will drop our rates sufficiently to hold the risk." In other cases, they conceive the idea that the Mutual Company can only carry a small portion of the risk anyway, and that if they can, through board obligations, prevent stock companies from co-operating with the Mutual, it will be unable to control the rates on the whole risk and thereby they can retain a part of it at their own high figures, besides having the guarantee of an improved risk through the inspection of the Mutual, without cost to themselves.

Several of the largest stock companies doing business in the country realized in the beginning the advantage of taking surplus insurance from the Electric Mutual Company and entered into an arrangement with that company, whereby they were to accept all risks offered and at rates named by the Mutual, and they were to pay their share of the expense of examinations. No sooner, however, had they secured a few risks in this way, than the local agent (who had lost the risk and thereby his big commission) began to pour his complaints into his companies that his inalienable (?) rights were being violated by board companies—that he was being deprived of good business that he could hold at high rates (and big commission) if the board companies would all stand by him and forsake the Mutual. The complaint was taken up by the "special agent" (the drummer of insurance), who is always eager to enhance the interests of his own company by catering to the feelings of his agent and crying out against the actions of other companies. The local board as a body made its solemn protest, and the cry passed all along the line that "rates were being cut by board companies." It came to the great "head centers," the large organizations composed of the companies, namely: the "Western Union," the "Middle States Department" and the "South Eastern Tariff Association." Their enquiry went forth, in solemn but determined order, to the companies who were quoted as co-operating with this Mutual—who were aiding and abetting it in its *nefarious* purpose of reducing and equalizing rates. The enquiry was somewhat after the following style: "You are quoted as having issued your policy on the electric light station at———, at one per cent., the risk having recently been rated at 3½ per cent. by this Association. Will you please advise us if the charge is true, also whether it is your purpose to sustain the rates of this Association or not?" At the same time the busy and ever present special agent would put in his work again with the local agent, by pointing out in his most vivid style the iniquity of the company that would issue a policy through the agency of a competing Mutual Company in the territory and over the head of their local agent. He would supplement this portrayal of wickedness by advising the agent to give his business only to those companies that would protect him and his rates. And so the offending company would receive its notice from that quarter, either to the effect that its agency was no longer wanted or by a suspension of business, which was tantamount to a notice to the same effect. Nor did it stop there, the special agent and the injured local agent had so poisoned the minds of other local agents that the wicked (?) company, if it sought a representative at another office, found the door locked against it. It seems to be an unfortunate condition of the business that the great insurance company, with its millions of dollars, is forced to make choice between two positions, either abandon its judgment and opportunities as to a certain class of desirable business at fair rates—the electric stations—or suffer the loss of its other good business. Furthermore, it seems that the "special agent" whose company don't insure electric stations anyway, is the loudest in his howling. He don't want the risk and he isn't willing his associate shall have it, because by inveighing against him he can ingratiate himself and his own company deeper into the heart of the local agent and secure the accompanying favors. It is the same old story of local board and local agent control. It has built up the system of Factory Mutuals in New England, which are insuring over $500,000,000 on the best manufactories in the country; and they are doing it at so small a cost that a number of the large stock companies, feeling sore over their past loss of this immense amount of insurance, and their continued losses, have recently formed a pool or syndicate to work independently of local boards and agents, and are offering to take these risks at one-quarter of one per cent. per annum.

It costs the manufacturers less to insure with the Mutuals, and they will probably stay there.

A number of the Factory Mutuals have insured electric plants for several years, and have only met with one loss. They now come forward, it is stated, and offer their co-operation with the Electric Mutual.

LAG SCREW WRENCH.

After the local agents with their big rates and big commissions have driven the electric station insurance into Mutuals, it will dawn upon the stock companies that such risks belong in the "preferred class," and their efforts to regain them will probably be equalled only by their action in driving them away now.

In the midst of the tempest that is raging in the insurance teapot, it is refreshing to see such sensible words as the following, from the *Insurance Times*, of New York, in a recent issue:

"In the West there is the sign of a big row over insurance of electric lighting plants by the new Electric Mutual Company, of Boston. A plaintive cry is heard all the way from Colorado that local agents have lost a large line on a station in that State, because the insurance has been handed over to the Boston concern. One company in this city has a four-page letter from a Colorado special on this topic, and he wants to know what the companies in New York are going to do to protect their Colorado agents. The probable answer is 'nothing,' because in a large majority of such cases the stock of the electric light company is owned in the East, and the owners take out their insurance here for other reasons than to deprive local agents of it. There are a score of corporations with headquarters in Boston, New York and Philadelphia, whose properties in the South and West are insured by companies in the cities named, for local reasons, which to the owners are quite as potential as the claims of local agents to the business."

Some large whiskey risks in Cincinnati were recently transferred from the agents of that place to agents in Peoria, Ill., presumably for reasons satisfactory to the owners of the property. The Cincinnati agents, who seem to think they own the whiskey as well as that part of the earth on which the city stands and considerable country adjacent thereto, got together, and after "whereasing" at great length, they resolved as follows:

"That we, the undersigned agents, representing the companies set opposite our names, hereby agree that if any companies represented in Cincinnati by authorized agents shall write policies of insurance upon any risk in the territory belonging to said agent or agents, or having written such policies, shall refuse to cancel the same within 10 days from date, we, each and every one of us, agree that we shall immediately cease to do any business for such company, and will hold the agency supplies subject to the company's orders; and we, each and every one of us, further agree that we will not accept the agency of any company which desires to change its local agents on account of the enforcement of this compact agreement."

Precisely the same disposition is manifested in relation to the insurance of electric plants in stock companies through any agent who don't happen to live next door to the plant. While such arbitrariness exists, it is not much wonder that legislatures enact laws adverse to the interests of insurance companies.

Boston, July 8, 1890.

The Westinghouse Electric Company.

CAPITAL INCREASED TO $10,000,000—EXHAUSTIVE REVIEW OF THE BUSINESS BY PRESIDENT GEO. WESTINGHOUSE, JR.

A meeting of the stockholders of the Westinghouse Electric Company took place on July 8th at the offices of the company in the Westinghouse Building, Pittsburgh, Pa. At this meeting the formal transfer of the stock of the Westinghouse Electric Company to the Westinghouse Electric and Manufacturing Company was made.

After that a proposition was laid before the stockholders for an increase of the capital stock of the company from $5,000,000 to $10,000,000. A resolution having been passed to this effect, the matter was put to a vote, which lasted an hour. At the termination of this period nearly 80,000 shares had been voting, and every one had been cast in favor of the increase

Mr. George Westinghouse, Jr., made the following statement to the meeting:

PITTSBURGH, PA., July 8, 1890.

To the stockholders of the Westinghouse Electric and Manufacturing Company:

Gentlemen: This company has now acquired the outstanding shares of the Westinghouse Electric Company, and by an action of a meeting of the stockholders of that company, held July 7, 1890, has succeeded to its property and business.

The company began the manufacture and sale of continuous apparatus for incandescent lighting, in 1886, which apparatus, however, could be commercially successful only for isolated lighting and central stations within moderate limits. Its capital was fixed at $5,000,000, with the expectation that that amount would meet the requirements of the business.

For the purpose of supplying apparatus for the distribution of electric light and power from central stations over large areas, it took up the alternating current system in 1886, up to which time none of the companies engaged in the business in the United States had considered that system commercially practicable; and it thus entered a field entirely its own.

To protect its business and successfully defend itself in any litigation that might be forced upon it by its competitors, the company found it desirable to fortify its patent position, and to that end acquired the control of the Consolidated Electric Lighting Company and the United States Electric Lighting Company, both of New York. The Consolidated Company was the successor of the Electro-Dynamic Light Company, of New York, the first company organized in the United States for the manufacture and sale of electric incandescent lamps, and the owner of a large number of patents of date prior to those upon which rival companies were depending. The company purchased nearly one-half of the capital stock of the Consolidated Company, and subsequently leased it at a rental equal to six per cent. per annum on its capital of $2,500,000.

The United States Company was organized in 1878, a few weeks after the Electro-Dynamic Company, and was the successor of the oldest company in the United States for the manufacture of electric power apparatus, and also owned a large number of early patents covering every necessary detail of lighting and power plants. The company purchased $700,000 of a total of $1,500,000 capital stock of the United States Company, and leased its patents and business at a rental which will ultimately equal six per cent. per annum on its capital stock. In addition to their patents these two companies had large and flourishing businesses and manufacturing plants, which were also acquired by the leases.

These purchases have greatly increased the standing and influence of the company, which now owns and controls 632 patents relating to electric lighting and power, and has now pending over 200 applications for patents for inventions necessary or desirable to the manufacture and operation of the latest improved forms of apparatus.

The success of the company is best illustrated by the report for 1889, already submitted, during which year the sales of the company and its leased companies amounted to $4,362,115.22, yielding a net profit of $729,307.87, after paying very heavy extraordinary charges incident to a new business of this character.

No branch of the electric business yields such large profits as the railway business, and the company has already entered this field. It has assured to itself the necessary patent protection to enable it to carry on the manufacture and sale of such appliances, and during the last three years has given close attention to the details of this class of apparatus; but it has refrained from selling the same until it could supply its customers with efficient and reliable equipments. The experience of users with the defective apparatus heretofore rushed out by other companies, fully justifies the wisdom of the company's action in this respect.

To-day the company is in receipt of orders and inquiries from all parts of the country, and has actually completed contracts for the equipment of 17 railways, aggregating $300,000, these orders having been received during the last 60 days. The volume of business offering to the company in this line indicates that its total output from the first of July this year to the first of July, 1891, may be doubled by the provision of adequate capital for carrying on this increased business, and with more than a corresponding increase in the returns. To enable the management to reap the greatest profit, the company should be placed in a position by its stockholders to do its business on a cash basis, and it should have available sufficient capital to take advantage of all profitable business offered to it.

The necessity for a large capital for a general electric business has been shown by the action of its two competitors; the Thomson-Houston Company having authority to issue $15,000,000, of which $11,500,000 have already been sold; while the Edison General Company has an issued capital of $12,000,000, which, according to its report to the Listing Company of the New York Stock Exchange, is still insufficient to carry on an extended business.

The board of directors are of the opinion that a total increase in the capital stock of not less than $5,000,000 should now be authorized in order to provide for the future requirements of the company, $3,000,000 of which may be issued by the directors from time to time as in their judgment may be deemed best, and the issue of the remaining $2,000,000 to be subject to the approval of a special meeting of the stockholders, called for that purpose.

It is proposed to issue forthwith to each stockholder of record on this date an assignable right to subscribe on or before August 1, 1890, for one-half share of stock for each share now standing in his name on the books of the company, at $40 per share, this price being determined by a distribution or an allowance from the surplus earnings. Of this price, one-quarter will be payable on August 1st, one-quarter September 1st, one-quarter October 1st and one-quarter November 1st.

Mr. Geo. Westinghouse, Jr., has agreed to take $1,250,000 of stock on the terms above indicated. If each of the other stockholders will subscribe to the number of shares to which he is entitled, the company will be enabled to provide for a large increase in its business. The board believe it to be to the pecuniary interest of each stockholder to subscribe for his amount of stock, and thereby aid in increasing the earning capacity of the company, which will have the immediate effect of enhancing the value of the shares already outstanding, and of the shares which in this manner will be secured at a reduced rate.

The board believed that great profit would accrue to the company by securing foreign patents on the more important of the inventions exploited by it in this country. This policy resulted in an order from the Metropolitan Electric Supply Company, Limited, of London, for a central station of 10,000 lights capacity, which has since been increased to 25,000. The station is now in operation with entire satisfaction, and is the most complete and perfect central station in Europe.

A company known as the Westinghouse Electric Company, Limited, has been organized in London, to operate these patents, and this company has received in payment for the patents and the money expended in the development of that business £301,000 of the stock of that company, which is the controling interest. The English company has recently received orders for other plants, and is in negotiations for others of a very extensive character, with every prospect of success. Indeed, the business abroad bids fair to reach proportions that will equal if not be greater than those of the parent company, and to be a source of great profit to it. The majority of the Board of the Westinghouse Electric Company, Limited, are also members of the Westinghouse Brake Company, Limited, of London, and the business is being conducted on the same lines which rendered the latter company so successful. Its operations are under the supervision and direction of Mr. H. M. Byllesby, the vice-president of this company, who is its managing director, and is now in England giving it his personal attention.

The following is a statement showing the financial condition of the company on June 1st of this year:

Cash	$74,508 58
Accounts receivable	1,341,535 58
Due from leased companies for cash advanced	539,591 33
Material in stock at cost	516,029 25
Material purchased for Newark factory	398,887 11
Real estate and buildings	401,854 75
Machinery, tools and fixtures	344,901 57
Stock in United States Electric Lighting, Consolidated and other companies, bought	1,597,664 18
Stocks and bonds received in settlement of accounts and for franchises	322,967 60
Stock of Westinghouse Electric Company, Limited	1,449,462 40
Charters, franchises, etc.	83,751 16
	$7,010,498 49
Patents: Some 632 patents covering the alternating current system, arc and incandescent, Tesla motor and other lines of manufacture of this company	4,111,312 09
Total assets	$11,121,810 58

LIABILITIES.

Bills payable, secured by collateral	$1,228,500 00	
Bills payable, outstanding for merchandise	317,011 43	
Bills payable for sundries	116,666 66	
Accounts payable	368,541 61	
Bills payable, given in purchase of shares of United States Electric Lighting Company, payable $37,500 quarterly	575,000 00	
Bills payable, given in purchase of Newark Storeroom stock, payable in monthly installments of about $15,000 each	324,269 43	
Cash advanced by Mr. Geo. Westinghouse, Jr.	1,241,705 42	
	$4,161,694 00	
Capital stock	$4,998,150 00	
		9,159,844 00
Surplus		$1,961,966 58

SOME NEW PATENTS.

A patent was recently issued upon an invention of John H. Cheever, of New York, for a protective covering for electric cables, consisting of a compound of rubber, plumbago, asbestos and sulphur, which it is claimed possesses all the merits of a lead sheathing, by reason of its capability of being formed continuously around the conductor by means of a pipe press, and has the advantage over lead of being a good insulating material and capable of withstanding a high degree of heat. The ingredients mentioned are mixed in a mill so as to produce a homogeneous mass, which is then squeezed through a pipe-press simultaneously with the conductor to be covered, and is afterwards vulcanized.

A reciprocating electric motor was recently patented by C. J. Van Depoele, in which a solenoid formed of three sections is arranged so as to alternately draw the core toward one end or the other. The central coil is connected permanently in circuit with a dynamo-electric machine, and a gradually rising and falling wave of current is caused to circulate through the two end sections of the solenoid, alternately, by means of an auxiliary movable brush sweeping around the commutator of the dynamo. Both terminals of the central section, and one terminal of each of the other sections, are connected with the fixed brushes, while the other terminals of the outer sections are joined and connected to the rotating brush. The alternate rise of current strength in the outer sections causes the core to rapidly reciprocate first toward one end of the solenoid and then toward the other.

A regulator for a dynamo electric machine has been invented and patented by G. A. Polson, of New York, which is somewhat of a departure from the regulators heretofore in use. It is applicable to generators of the ring armature type. The ring is supported from the spindle on one side, and within the ring is an auxiliary field magnet, through the exciting coils of which a varying current is caused to pass, depending on the strength of the current on line, and this auxiliary field magnet is so polarized that its north pole will be opposite the north pole of the main field magnet, and the south pole opposite the south pole of the main field magnet. By means of this construction the lines of force are caused to cut both sides of the conductor surrounding the ring core, and, when current is flowing through the coils of the auxiliary field magnet, the amount of available current generated is reduced by reason of both sides of the coils being cut, and opposing electromotive forces developed.

—— The Malden, Mass., Electric Company held its annual meeting July 2, and voted to increase its capital from $100,000 to $150,000. It re-elected its old board of directors, John S. Bartlett, H. A. Royce and J. N. Smith. The usual quarterly dividend of two per cent. was declared, payable July 15.

ELECTRIC LIGHT NEWS

—— The Pennsylvania Railroad Company is putting in an electric light plant at Logansport, Pa., to light the yards and shops at that point.

—— The town of Coaticook, Canada, has contracted for a plant of 30 arc lights and 500 incandescent lights. Water power will be used for the motive power.

—— The Governor of Massachusetts has vetoed the bill authorizing the consolidation of gas and electric light companies. The Senate refused to pass the bill over the veto.

—— The Bellevue, Kan., Electric Light Company has begun work on the foundation of the plant, and it is expected that all will be completed long before the time allowed under the contract.

—— The city government and the electric light company, of Worcester, Mass., have agreed upon a three years' contract for street lighting at 40 cents per night per light of 2,000 candle-power. The old rate was 55 cents.

—— The Pyle electric headlight, manufactured at Indianapolis, has been successfully tested on the Columbus, Hocking Valley and Toledo Railway. So satisfactory were the results, that the light will be placed, it is said, on all passenger engines of the road.

—— The Badger electric light plant, of Milwaukee, Wis., has been purchased by the Edison-Villard Electric Light and Power Company, of New York, which controls an exclusive franchise for putting in an extensive incandescent plant. The deal is said to involve also the Cream City and Milwaukee City street railway lines.

—— Work on the electric light plant of Elizabeth, Pa,, has been subject to a number of annoying delays, and it will now be some weeks before it can be put in shape for operation. The machinery is being set up in the building, and everything is on the ground for the plant, except the poles. The inside wiring is all completed.

—— The City Water Company, of Peoria, Ill., shut off the water at the old station of the Jenney Electric Light and Power Company just about lighting up time, a few nights ago, causing a good deal of inconvenience. They were requested to defer shutting off the water until 10 P. M., but they refused to grant any accommodations whatever in this direction. The Electric Light Company is at a loss to know why this strange act should be persisted in.

—— The new plant of the Fremont, Ohio, Electric Light and Power Company and the Fremont Gas Company is now completed. It is a model in the way of solidity, commodious and convenient arrangement. It occupies the site of the old illuminating gas works, established 26 years ago. On the first of January last, the gas plant was sold to the gentlemen who owned the electric light plant, and the whole business is now under one ownership and management, although incorporated as two companies. As soon as the consolidation was effected, the gas works were remodeled, new buildings and machinery added, and the electric light plant moved to the new station. This has just been completed. The new brick stack is 90 feet in height, the tallest in the city. The engine room, dynamo room and office are handsomely finished. The power is supplied by two Ball engines, one of 80 and one of 100 horse-power, and four 50-lamp dynamos are used. The station is operating about ninety 2,000 candle-power street lamps, which burn every night from dusk to sunrise, and about 70 commercial lights.

ELECTRIC CLUBS.

WHAT IS HAPPENING IN NEW YORK AND BOSTON.

New York Electric Club.

Mr. J. N. Pratt, general manager of the Jarvis Engineering Company, was a New York visitor last week. Mr. Pratt is always a welcome visitor at the Electric Club.

Mr. R. M. Huston recently tells how he took a brief respite from his duties as eastern representative of the Heine boiler, and went fishing for bluefish down in Buzzard's bay. He had great luck, as do all electrical fishermen, and his catch of bluefish was very large, so large, in fact, that he sent, carefully packed, a basket of fish to a household in New York where he knew his gifts would be appreciated. But the intellectual expressman left the fish out in the sun the day the thermometer was at 100 in the shade, and the result may be imagined. Delegations from the Board of Health have been visiting the neighborhood to find what was wrong, and the smell of fish—not of roses—lingers there still. Mr. Huston says he will send no more fish by express, but deliver them himself hereafter.

Col. J. N. Keller, of Boston, a well-known member of the New York Club, sailed for London on Saturday last. Mr. C. J. French, of the American Bell Telephone Company, also goes abroad with Col. Keller.

The First Meeting of the board of managers since the return of President Madden, was held Thursday evening of last week, and a number of new members were elected and much business relating to the running of the Club was transacted.

Notwithstanding the Hot Weather, the Club remains a popular centering point for the electrical people of this city and for visitors from out of town. The change of the pool and billiard room from the basement to the second floor has increased the popularity of this feature of Club life, as the new room is one of the pleasantest in the city.

Boston Electric Club.

New Applications for active membership are being frequently handed in, and the Club continues to prosper.

Treasurer F. J. Boynton has fully recovered from his recent sickness.

Col. C. M. Ransom, who has been a very sick man during the past three months, is rapidly recuperating.

Photograph Group of members who attended the outing at Marblehead Neck, recently, is on exhibition at the Club rooms, and copies may be purchased from the steward.

Refreshing Southerly Breezes, which prevail in this section nearly every evening, sweep from over the Common through the pleasant parlors of the Club and cool the overheated members who seek rest and recreation after the day's toil is o'er.

Yachting Parties composed of Club members are becoming more and more frequent, and before the Summer season is over, these amateur yachtsmen will have visited each cove and secluded spot along the shores of Boston harbor and Massachusetts Bay.

Report of Alabaster, Gatehouse & Co., of London, on the Weymersch Primary Battery.

We have been asked by the syndicate owning the Weymersch battery to publish the following report:

22 PATERNOSTER ROW, E. C.,
June 18, 1890.

Gentlemen: In accordance with your instructions, we have made some practical tests with the Weymersch primary battery, and we now submit to you the results we obtained. Prior to entering into the details of these trials we desire to call attention to our former experiments made in the month of June, 1888, in which a five cell battery was kept continuously at work for 31½ hours, giving a current of 10 to 10.6 amperes. The free potential of the cells varied only about three per cent. and the working electromotive force was practically the same at the end of the run as at its commencement; the consumption of zinc, moreover, was only 10 per cent. in excess of that indicated by theory. We were thus enabled to report that, in our opinion, Mr. Weymersch's battery, was a great advance on any galvanic elements previously employed for the generation of comparatively heavy currents.

The Weymersch cell is of the double fluid type, the electrodes being zinc and carbon, with an exciting solution of dilute sulphuric acid, and a depolarizing solution containing several well-known ingredients, the proportions and preparation of which the inventor keeps to himself. The respective liquids are separated by a porous pot or plate, according to the mechanical construction of the battery.

The main difference between the conditions of 1888 and those of the present date consist in the diminished size of the cells, the substitution of porous plates for pots, and some slight variation in the strengths of the exciting and depolarizing solutions.

The batteries as recently submitted to us consisted of wooden boxes each containing six cells with double zinc and single carbon plates. Seven of these were connected up in series, thus making a battery of 42 cells. After some preliminary trials, extending over several days, with both arc and incandescent lamps, we obtained the results which, in tabulated form, are attached. We here desire to remark that we should not expect to get in other sets of batteries precisely similar figures, as the latter greatly depend upon the nature and porosity of the porous diaphragms which, as all users of batteries are well aware, are usually found to be variable in their character.

The external dimensions of each box are as follows: Length — 3 feet, including taps, etc., width — 9 inches, depth — 16 inches over all, including covers. The inventor only guarantees his battery to run for 18 hours with one charge of depolarizer, but it will be seen that there was but little change in the electrical constants of Table I at the end of a 24 hours' run, so that the guarantee is within very safe limits. The arc lamp circuit, moreover was kept running even longer (30 hours) with one charge of depolarizer.

The measuring apparatus used by us in the trial runs were kindly lent by the General Electric Company; Messrs. Siemens Bros.; Messrs. Paterson and Cooper; the Planet Electrical Engineering Company and Mr. A. R. Margary, who assisted us throughout; and we desire here to place on record our appreciation of the excellence of the various voltmeters and ampere meters supplied to us, and the close agreement of their indications, which show careful calibration.

Finally, however, to measure differences of potential we selected a Siemens potential galvanometer and a Cardew voltmeter. The readings of these two instruments were to all intents and purposes identical, as may be seen by the following comparison:

Siemens 54·325 volts,	74·82 volts
Cardew 54·33 "	74·6 "

As the current measurer, we employed on the circuit of incandescent lamps a newly calibrated Siemens electro-dynamometer, and on the arc light circuit a Miller's patent ampere meter.

The conditions under which the tests took place were as follows:

For the incandescent lamps there were used 42 cells and for the arc light 36. The daily run, to represent as nearly as possible what would probably occur in actual domestic use with glow lamps, was of six hours' duration. At the end of each run the exciting solution was drawn off and renewed on the following day prior to the battery being put in action. For the first 12 hours the exciting solution was at the density of 7° Beaume, and at a temperature of 52° Fahr.; for the next 12 hours the acidulated water was strengthened to 10° Beaume. On the fifth day the depolarizer showed signs, at the beginning of the run, of becoming exhausted, so the experiment was stopped.

Although the depolarizer was unchanged throughout the experiment and not emptied from the cells at night, it is necessary to say that owing to a certain degree of leakage through the porous plates, a small quantity of fresh liquid had to be added each morning to bring up the level again.

The zinc plates, 7½ inches, were immersed to a depth of 7⅜ inches, and the total weight of the 84 plates amounted to 280 lbs. 4½ oz. When weighed after the trial the result showed that 176,190 grains of zinc had been consumed, or 28 per cent. in excess of that theoretically necessary to produce the same electrical energy, viz., 9,477 watts.

We find that the cost of materials alone (taken, with the exception of the depolarizer, at their market values), leaving out of consideration depreciation, cost of maintenance, labor, etc., to produce one unit of electrical energy (1,000 watt hours) amounts to 2.13 shillings if the depolarizer is charged for at 9*d.* per gallon. If, however, this is taken at its actual cost price, the cost per unit is then reduced to 1*s.* 6*d.*

Putting this result in another way, and taking a good 16 candle-power incandescent lamp as requiring 50 watts to heat it to that luminosity, we find that the cost per hour (for materials) to keep such a lamp in action is, in the one case, 1.275 penny, and in the second 0.9 penny. A slight reduction in the prices of materials, which would probably result from buying them in larger quantities, would practically mean that a 10 candle-power lamp, a convenient standard for comparison, would cost (for materials) actually ¼*d.* per hour.

To arrive at the cost per unit, including consumption of material, labor, depreciation, cost of maintenance, etc., would necessitate a series of renewal tests lasting over a lengthened period, so we purposely avoid all reference to expense other than that of material used up, for the simple reason that the batteries will be sold outright, just in the same manner as a shop keeper would sell an oil lamp, the buyer placing it under the control of his servants and the operations connected with its use coming within their daily duties. Naturally the manipulation of a primary battery varies with the nature of the person employed to look after it, and from other causes, and while in one instance it may entail but little trouble, in another case the attendant difficulties may be considerably increased.

It might, perhaps, be urged that the user of a primary battery will not reap the advantage of all his outlay on materials consumed, as he cannot leave the zincs in position until the metal has been all dissolved; but this objection is met by an arrangement by which the consumer is supplied with an equivalent weight to that unconsumed of new zinc, so that in reality he loses nothing in the shape of waste material.

The circumstances under which the arc circuit was run were slightly different to those of the other tests. The daily duty, as with the incandescent lamps, was six hours of continuous work, but instead of renewing the exciting liquid each day it was drawn off at the end of a run, and used over again for the following six hours; in other words, fresh liquid was used every alternate day and its density was kept constant at 7° Beaume.

The depolarizer also had nothing added to make up for leakage for the first two days, but for the remainder of the time it was replenished by a small addition each morning.

The lamp used was a "Planet" arc, manufactured by the Planet Electrical Engineering Company, under Macquaire's patent, and it is, perhaps, scarcely necessary to add that for a given amount of electrical energy the light from an arc lamp is from seven to ten times that given by the normal incandescent; so where single lights of considerable candle-power are concerned it follows that arc lamps are more economical, but if such incandescent lamps as that known as the "Sunbeam" are employed, the difference in cost becomes less.

The temperature of the fluids at no time exceeded 70° Fahr., a fact which in itself speaks well for the working of the combination.

We still consider that the Weymersch battery is the best galvanic generator of heavy currents that has yet been brought forward for domestic use, and it contains more nearly all the essentials of a theoretically perfect element than any other which we, in the course of a long and varied experience, have yet seen. * * * * *

No engineer or electrical expert would (or ought to) think of comparing the cost of electrical energy from the steam engine and dynamo with that entailed by the employment of primary batteries; yet to show that the cost per unit from a good voltaic combination is not so prohibitive in special cases, we may mention the Chelmsford lighting, where consumers are to be charged 1*s.* 3*d.* per unit. * * * * * * *

We may add that since 1888 the battery has undergone very great improvements of a mechanical nature, and that the method about to be adopted for filling and emptying should render its manipulation a very easy matter for the ordinary householder or his staff of domestics; indeed, the apparatus may now be considered as quite adapted to household use. We remain, gentlemen,

Faithfully yours,
H. ALABASTER, GATEHOUSE & Co.

TABLE I.—INCANDESCENT CIRCUIT.

Date. 1890.	Time.	Duration in hours	Current (C) amperes.	E.M.F. volts. Open.	E.M.F. volts. Closed.	Resistance of battery. Ohms.	C.E.T. external circuit. Watt hours. Actual.	C.E.T. external circuit. Watt hours. Average.	Theoretical weight of zinc consumed, with average current per cell. grains.	Actual weight of zinc dissolved in grains per cell.	Difference between theoretical and actual consumption per cent.	Exciting solution, 7° quarts, 7° Beaume.	Depolarizer, in quarts.	Temperature of solution, Fahr.
May 19...	11.0		7.164	84.05	53.30	4.30	381.8	.....	.....	.....	.....	84	44	
	12.0		7.240	77.90	55.00	3.16	398.2	390.0	134.8					
	1.0		7.240	77.90	55.00	3.16	398.2	398.2	135.5					
	2.0		7.164	76.50	54.84	3.02	392.8	395.5	134.8					
	3.0		7.087	76.00	54.80	2.99	388.3	390.5	133.8					
	4.0		7.010	75.85	55.80	3.15	377.2	382.7	131.9					
	5.0	6	6.960	75.34	52.00	3.36	361.4	369.3	130.6					
May 20...	11.15		7.240	74.82	53.80	2.90	389.5	.....	.....	.....	.....	84	3.5 added	
	12.15		7.240	74.00	53.80	2.79	389.5	389.5	135.5					
	1.15		7.230	74.00	54.50	2.70	394.0	391.7	135.4					
	2.15		7.240	73.90	54.40	2.69	393.8	393.9	135.4					
	3.15		7.087	73.80	52.80	2.96	374.2	384.0	134.0					
	4.15		7.087	73.50	52.80	2.92	374.2	374.2	132.6					
	5.15	6	6.930	73.40	51.25	3.20	355.1	364.7	131.1	4195	27.9			
May 21...	11.0		7.240	74.82	54.02	2.87	391.1	.....	.....	.....	.....	0°Beaume	2	62°
	12.0		7.540	74.00	55.20	2.50	416.2	403.6	138.8			84	added	
	1.0		7.640	73.50	55.00	2.42	420.2	418.1	142.0					
	2.0		7.640	73.50	55.50	2.36	424.0	422.1	143.0					
	3.0		7.540	73.50	55.20	2.43	416.2	420.1	142.0					
	4.0		7.460	73.40	54.32	2.56	405.1	410.6	140.3					
	5.0	6	7.425	73.20	53.75	2.62	399.0	402.0	139.3	.....	.....	.....	.....	66°
May 22...	11.0		7.399	74.50	53.50	2.84	395.8	.....	.....	.....	.....	84	2	
	12.0		7.460	73.30	54.00	2.59	402.7	399.2	139.0				added	
	1.0		7.460	73.30	54.00	2.59	402.7	402.7	139.6					
	2.0		7.399	73.30	53.80	2.64	398.0	400.3	139.0					
	3.0		7.399	73.10	53.50	2.65	395.8	396.9	138.5					
	4.0		7.314	73.00	53.30	2.69	389.8	392.8	137.7					
	5.0	6	7.240	72.75	52.50	2.80	380.1	384.4	136.2					
		24						9477.0	3279.8					

TABLE II.—ARC CIRCUIT.

Date. 1890.	Time.	Duration in hours.	Current (C) amperes.	E. M. F. volts. Open.	E. M. F. volts. Closed.	Resistance of battery. Ohms.	C.E.T. external circuit Watt hours.	Theoretical weight of zinc dissolved. Grains per cell	Actual weight of zinc in grains dissolved per cell.	Difference between theoretical and actual consumption per cent.	Exciting solution, 7° Beaume, in quarts.	Depolarizer, in quarts.	Temperature of solution, Fahr.
May 5	12.30		6.1	69.0	51.25	.....	.....	.....	.....	.....	72	37	62°
	1.30		6.0	62.5	47.0								
	2.30		6.0	71.75	47.50								
	3.30		6.0	63.55	47.50	2.67							
	4.30		6.0	63.55	47.50								
	5.30		5.9	62.5	46.75								
	6.30	6	5.9	62.5	46.75	.....	8129.2	3318	3662	10.367	.....	.....	62°
May 6	11.0		6.0	63.55	46.12	.....	.....	.....	.....	.....	.....	.....	62°
	12.0		5.9	63.55	46.12								
	1.0		5.9	63.9	46.12								
	2.0		5.8	63.9	45.10								
	3.0		5.8	63.9	45.10								
	4.0		5.8	63.9	45.10								
	5.0	6	5.8	63.9	43.05	.....	.....	.....	.....	.....	.....	.....	62°
May 7	10.30		6.0	64.55	48.17	.....	.....	.....	.....	.....	72	3	64°
	11.30		5.8	65.6	49.20							added	
	12.30		5.8	63.9	47.50								
	1.30		5.8	63.9	47.50	2.83							
	2.30		5.8	63.9	47.50								
	3.30		5.8	63.9	47.50								
	4.30	6	5.8	63.9	47.50	.....	.....	.....	.....	.....	.....	.....	64°
May 8	10.30		6.0	63.9	45.50	.....	.....	.....	.....	.....	.....	2	62°
	11.0		6.0	63.9	46.50							added	
	12.0		6.0	64.6	46.50								
	1.0		6.0	63.9	46.12								
	2.0		5.9	63.9	45.10								
	3.0		5.8	63.5	44.10								
	4.0		5.8	63.5	44.10								
	4.30	6	5.9	63.5	43.05	.....	.....	.....	.....	.....	.....	.....	70°
May 9	10.30		6.5	63.5	41.0	.....	.....	.....	.....	.....	72	2	68°
	11.0		6.0	63.9	45.10							added	
	12.0		5.9	63.9	47.10								
	1.0		5.8	63.9	46.60								
	2.0		5.9	63.3	46.12								
	3.0		5.8	63.5	45.30								
	4.0		5.9	61.0	41.00								
	4.30	6	5.8	59.5	36 90	3.88							
		30											

KINDRED INTERESTS

The Stilwell & Bierce Manufacturing Company, of Dayton, Ohio, is about to make up a train of eight car loads of machinery for the Spokane Falls Electric Light Works. The freight charges will be something like $5,000.

The Gibson Gas Fixture Works, of Philadelphia, issue a card under date of July, in which attention is again called to the fact that they sell exclusively to dealers in electric light and gas fixtures and that their customers obtain the best prices and lowest terms.

The India-Rubber & Gutta-Percha Insulating Co, William M. Habirshaw, general manager, has purchased an extensive factory at Glenwood, near Yonkers, N. Y., and is fitting it up with the latest appliances for the manufacture of high grade insulated wire. This company has been rushed with business, and is now working night and day. It is expected that the new factory will be ready about September 1, when a much larger product can turned out.

The Mitchell-Vance Company have just secured a contract for furnishing combination fixtures for the City Hall, at Fall River, Mass. There are over 500 lights in the building. The Edison system is used. They are also making combination fixtures for the large building just built by the Canada Life Insurance Company, in Toronto. Over 800 lamps have been installed. Col. J. H. Bass, of Fort Wayne (a director of the Fort Wayne Electric Company), has placed with the Mitchell-Vance Company an order for handsome fixtures for a new residence he is building in Fort Wayne. Mr. J. R. Wood, of the Fort Wayne Company, will light his house with electric light. He is having made some very fine fixtures, most of them from special designs.

The Thomson-Houston Electric Company, through their Chicago office, report the following sales for the month of June: Capitol Electric Company, Nashville, Tenn., 7 motors, from ¼ h. p. to 50 h. p.; Mount Clemens Electric Company, Mt. Clemens, Mich., 650 light alternating incandescent; Salt Lake Power, Light and Heating Company, Salt Lake City, Utah, 170 arcs; Atchison Gas & Electric Light Company, Atchison, Kas., 650 alternating incandescents; B. Nugent & Bro., St. Louis, Mo., 1 h. p. motor; Logan Light, Power and Heating Company, Logan, Utah, 650 alternating incandescents; Gogebic Electric Company, Bessemer, Mich., 1,950 alternating incandescents; Bodge Manufacturing Company, Mishawaka, Ind., 650 alternating incandescents; Inter-Ocean Publishing Company, Chicago, 2 motors; Capitol Electric Company, Nashville, Tenn., 350 arcs; Huntington Cotton Manufacturing Company, Huntington, Ark., 750 direct incandescents.

A. L. Ide & Son, Springfield, Ill., report the following sales and shipments of their Ide and Ideal engines: Wm. Barr, Dry Goods Store, St. Louis, Mo., 50 horse-power; The Prescott Co., Atlanta, Ga., 35; Marinette Iron Works Co., West Duluth, Minn., 35; City of Newton, Iowa, 100; Moffett, Hodgkins & Clarke, La Grange, Ill., 65; Minonk Electric Light and Power Co., Minonk, Ill., 35; Union Rapid Transit Co., Salt City, Utah, 250; Minnesota Institute for Defectives, Fairbault, Minn., 65; Browning, King & Co., Minneapolis, Minn., 35; Mansfield Machine Works, Mansfield, Ohio, 100; Chicago City Railway Co., (second order) Chicago, Ill., 80; Peter Schmidt, Milwaukee, Wis., 80; Springfield Electric Light and Power Co., Springfield, Ill., two 125; Nordyke & Marmon Co., Indianapolis, Ind., one 65; English, Morse & Co., Kansas City, Mo., two 40 and one 50; N. P. Railway, Cinnabar, Mon., one 50; Camden Electric Light and Power Co., Camden, Ark., one 30; J. A. Fay & Co., Chicago, Ill., one 35; Creston Gas and Electric Light Co., Creston, Iowa, one 100; Ft. Wayne Electric Co., Ft. Wayne, Ind., one 65; Riverton Land Co., Sheffield, Ala., one 35; Texas Ice and Cold Storage Co., Galveston, Texas, one 10; Pittsburgh Gas Light Co., Pittsburgh, Kan., one 125; Findlay Electric Light and Power Co., Findlay, Ohio, one 100; Colorado Electric Supply and Motor Co., Denver, Col., one 15; Shreveport Street Railway and Land Co., Shreveport, La., one 150; Thomson-Houston Electric Co., Clinton, Iowa, one 150.

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ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENTS OF THE UNITED STATES WERE ISSUED ON JULY 8, 1890.

431,551 Electric ceiling block; Waldo C. Bryant, Bridgeport, Conn.

431,559 Magneto-electric machine; Arthur E. Colgate, New York, N. Y., assignor to F. G. Otto & Sons, same place.

431,564 Apparatus for cutting electrical conduit pipes; Sylvester P. Denison, Brooklyn, N. Y., assignor to Geo. R. Thompson, Philadelphia, Pa.

431,581 Internal combustion thermo-motor; Jas. Hargreaves, Farmworth, county of Lancaster, England.

431,597 Electric signaling apparatus. 431,598 Signaling apparatus; Geoffrey B. Lehy, Medford, Mass.

431,617 Apparatus for preparing electric accumulator plates; Chas. F. Poliak, Paris, France.

431,618 Regulator for dynamo electric machines; Gustavus A. Polson, New York, N. Y., assignor of one-half to Samuel Carey, same place.

431,630 Conduit. Thos Wallace, New York, N.Y.

431,633 Conduit for electric railways. 431,634 Electric railway; Joseph H. Wehele, Newark, N. J.

431,649 Electric motor apparatus; Stanley C. C. Currie, Philadelphia, Pa., assignor to the United Gas Improvement Company, same place.

431,651 Private line telegraphy; Patrick B. Delany, South Orange, N. J.

431,681 Incandescent lamp socket; James J. Wood, Brooklyn, N. Y.

431,684 Trolley pole supporting mechanism; Johan M. Anderson, Boston, Mass.

431,711 Electric railway; Sidney H. Short, Cleveland, Ohio.

431,718 Thermal cut-out; Lorenzo B. Favor, Bridgeport, Conn, assignor to the Thermal Electric Company, of Maine.

431,720 Electric railway; Rudolph M. Hunter, Philadelphia, Pa., assignor to the Electric Car Company of America, same place.

431,721 Means for attaching and detaching electric lamp bulbs; Solomon J. Jacobs, New York, N. Y.

431,742 Galvanic battery; Chas. R. Goodwin, Paris, France, assignor to the Electric Gas Lighting Company, Boston, Mass.

431,776 Incandescent lamp; Geo. R. Lean, Boston, Mass., assignor to the Bernstein Electric Company, Portland, Me.

431,777 Electric device for slaughtering animals; Jacob D. Miller and James A. Dorflemyre, Gunnison, Col.

431,780 Subway for electric cables; Walter L. Paisley, Wilmington, N. C.

431,784 Printing telegraph; Geo. B. Scott, Lakewood, N. J.

431,793 Automatic telegraphy. 431,794 Automatic telegraph; Frank Anderson, Peekskill, N. Y.

431,810 Aural attachment for telephone receivers; Edwin C. Hess, Montreal, Canada, assignor of two-thirds to Frank Caverhill, same place, and Frank S. Harrison, Newark, N. J.

431,812 Dynamo; Edw. H. Johnson, New York, N. Y.

431,823 Electric railway motor; Frank J. Sprague, New York, N. Y., assignor to the Sprague Electric Railway and Motor Co., same place.

431,859 Apparatus for electrical conversion; Edward N. Dickerson, Jr., New York, N. Y.

431,883 Automatic coin controlled phonograph; Leon F. Douglass, Grand Island, Neb.

431,955 Metallic pole for electric wires, etc.; Joseph F. Schnieder and David K. Carson, St. Louis, Mo., said Carson assignor to William H. Myers, same place.

431,962 Transfer connecting apparatus for multiple switchboards; Enos M. Barton, Chicago, Ill., assignor to the Western Electric Company, same place.

431,968 Process of forming porous pots for voltaic batteries; Chas. R. Goodwin, Paris, France, assignor to the Electric Gas Lighting Company, of Maine.

431,973 Hanger for trolley wires; John T. Herty, Boston, Mass.

431,977 Electric railway; Rudolph M. Hunter, Philadelphia, Pa., assignor to the Thomson-Houston Electric Company, of Connecticut.

431,978 Electro-therapeutic appliance; Abram W. Jackson, New York, N. Y., assignor to the De Groot Electric Company, of New York.

431,979 Automatic fire alarm; Henry E. Jacobs, Milwaukee, Wis.

431,987 Printing telegraph; Andrew T. McCoy, Boston, Mass., assignor to John Anderson, New York, N. Y.

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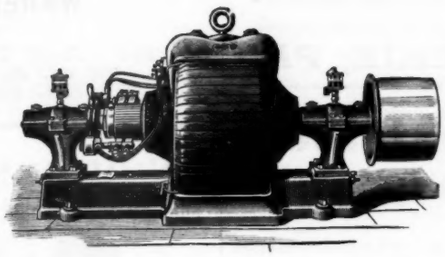

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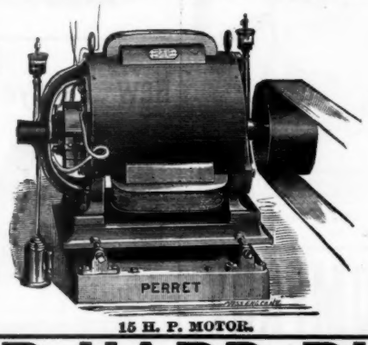

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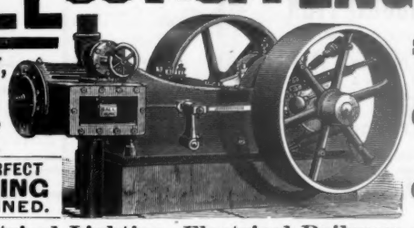

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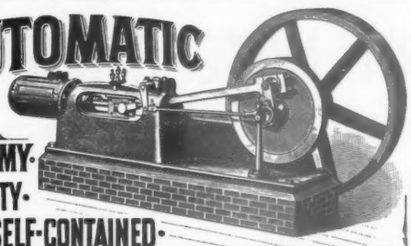

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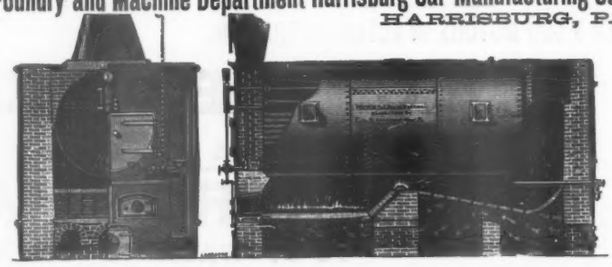

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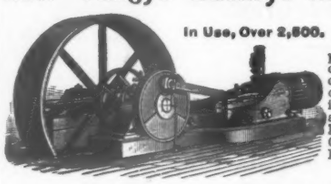

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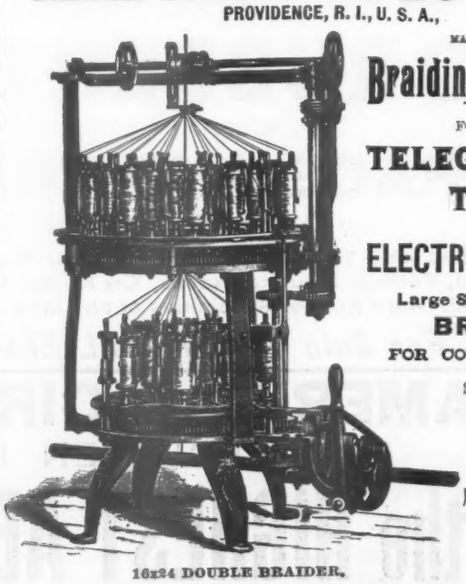

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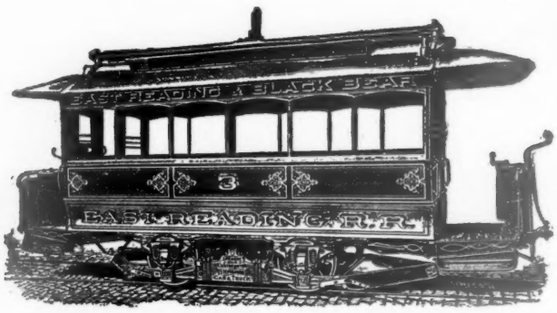

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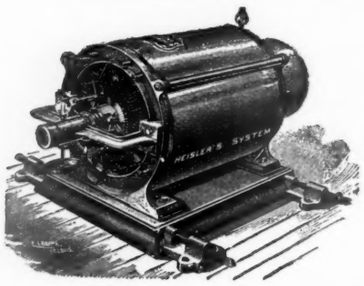

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							5,000 FEET PER MINUTE.	
C	8	.....	.....	.....	6.5	1¼		530
D	.....	10	.....	.....	6.3	1¼		530
E	.....	.....	.....	25	8.0	2		530
F	16	.....	.....	.....	12.0	2¾		780
G	.....	20	.....	.....	12.5	2¾		780
H	.....	.....	26	.....	13.0	2¾		780
I	20	.....	.....	.....	15.0	3		990
J	.....	25	.....	.....	15.6	3		990
K	.....	.....	32	.....	15.0	3		990
L	.....	.....	.....	50	16.0	3		990
M	28	.....	.....	.....	21.0	4½		1,360

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G	.....	35	.....	.....	21.0	4		1,360
G	.....	.....	45	.....	21.0	4		1,360
H	.....	.....	.....	70	21.0	4½		1,360
H	40	.....	.....	.....	29.7	6		1,750
I	.....	50	.....	.....	30.0	6		1,750
I	.....	.....	64	.....	29.5	6		1,750
J	52	.....	.....	.....	38.0	8		2,200
J	.....	65	.....	.....	38.6	8		2,250
K	.....	.....	83	.....	38.0	8		2,250
K	64	.....	.....	.....	46.5	10		2,770
L	.....	80	.....	.....	47.1	10		2,770
M	75	.....	.....	.....	52.5	12		3,200

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SPECIAL NOTICE.

VOL. VII and VIII,
PROCEEDINGS OF THE
National Electric Light Ass'n Conventions.
Held at Niagara Falls and Kansas City,
Will be published in July (in book form, cloth bound).
It has been decided to accept a few pages of appropriate advertising.
This matter has been placed in charge of the
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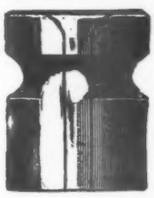

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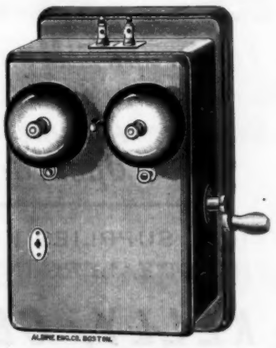

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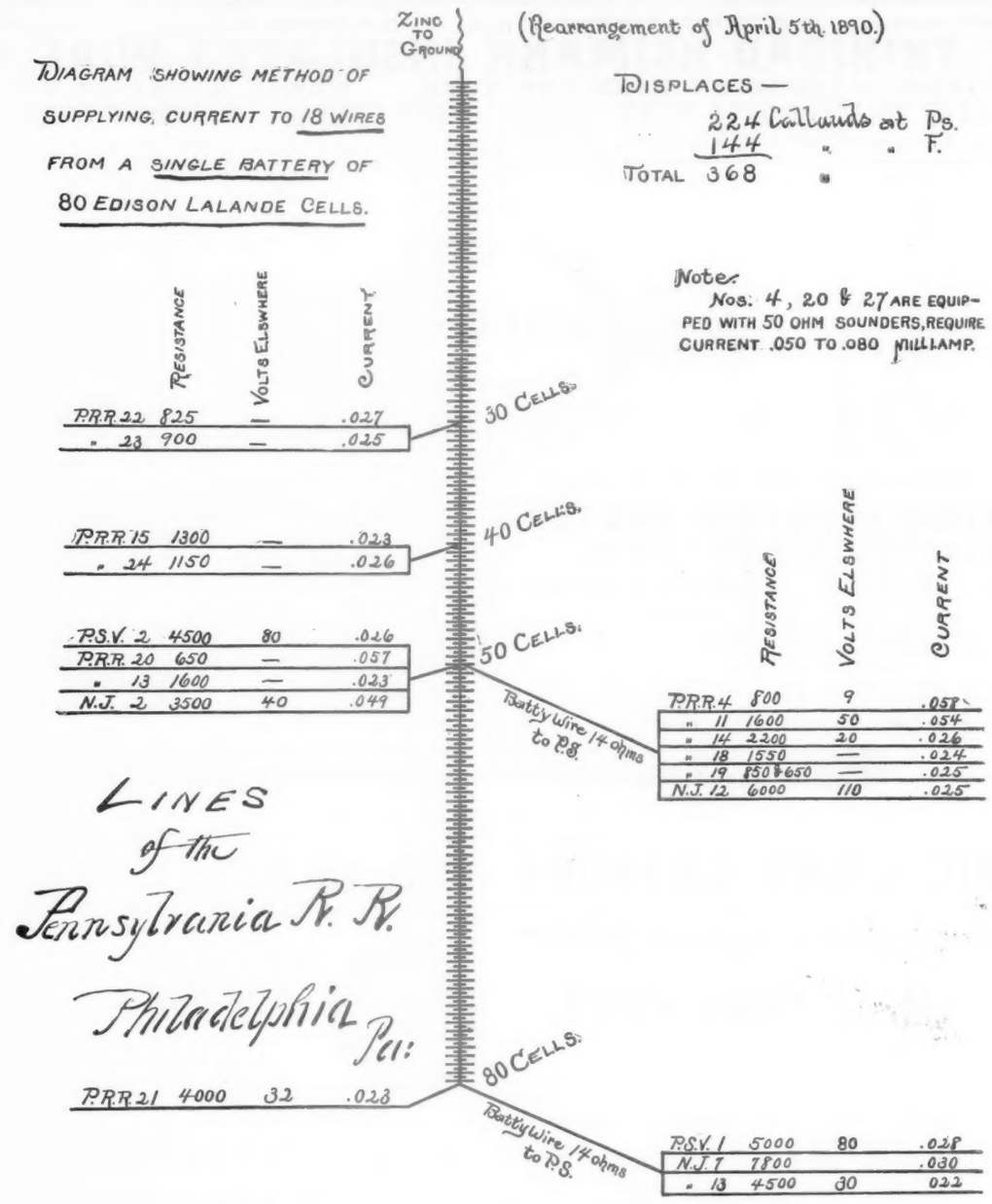
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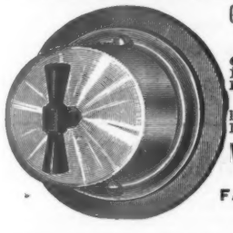

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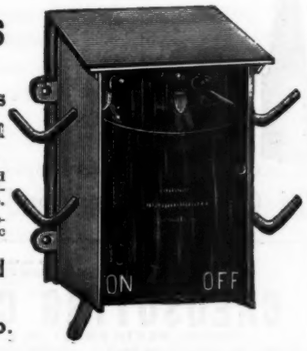

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FIG. 2.

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FIG. 3.

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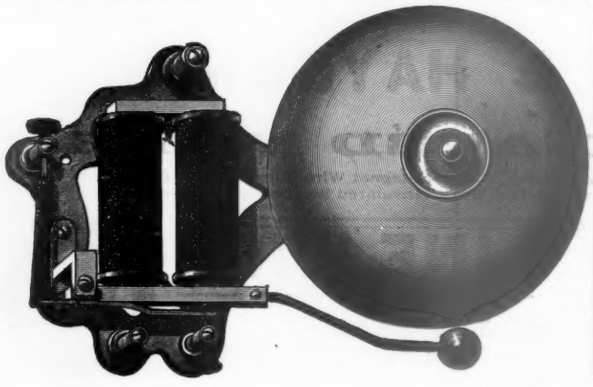

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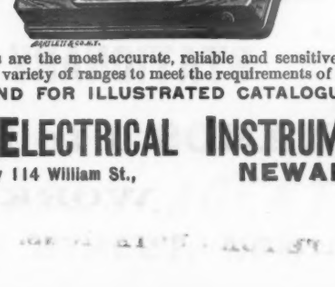

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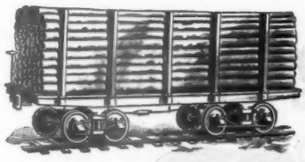

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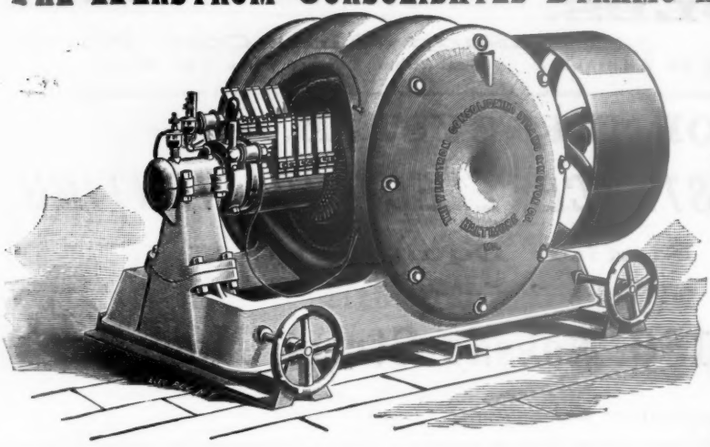

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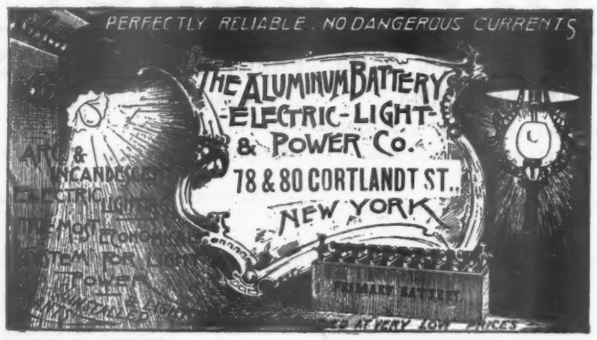

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WESTERN OFFICE,

Room 456, THE ROOKERY.

CHICAGO.

GREAT WESTERN ELECTRIC SUPPLY CO.

190–192 FIFTH AVENUE, CHICAGO.

THE DENVER CONSOLIDATED ELECTRIC COMPANY,
General Office: 1534 Lawrence Street,
Denver, Colo., June 26, 1890.

MR. GEORGE CUTTER, Manager,
GREAT WESTERN ELECTRIC SUPPLY CO.,
FIFTH AVE., CHICAGO.

DEAR SIR:

Samples of **SIMPLEX WIRE** have arrived. Have had **No. 6** in bucket of water with bucket connected to one side of Brush Dynamo and wire to other side, and nothing but insulation to prevent short-circuiting a potential of **2,208 VOLTS, FOR OVER 50 HOURS**, and it is as good as ever yet, and apparently good for a long time. The **OTHER WIRE** tested gave out under same test in **ONE HOUR, 40 MINUTES**, and it is an expensive wire, too.

(Signed) H. BOTTOMLEY.

This talks better than the order for **ONE MILLION FEET** which we refused because price offered was less than cost of making a reliable insulation.

WE WILL NOT LOWER THE QUALITY OF SIMPLEX WIRE.

JUST COMPLETED

THE LARGEST AND BEST EQUIPPED

INCANDESCENT LAMP FACTORY

IN THE WORLD.

SAWYER-MAN ELECTRIC CO.

510–524 WEST 23D STREET,

NEW YORK.

Fort Wayne Electric Company,

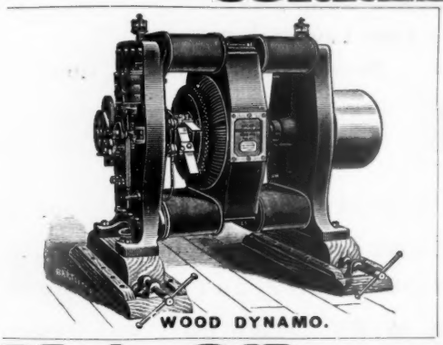
FORT WAYNE, IND.

The most carefully worked out and Complete Alternating System of Electric Lighting in existence.

ARMATURES AND CONVERTERS GUARANTEED.

12 16-candle-power Lamps to the mechanical horse power guaranteed

CORRESPONDENCE SOLICITED.



WOOD DYNAMO.

MANUFACTURERS

—OF THE—

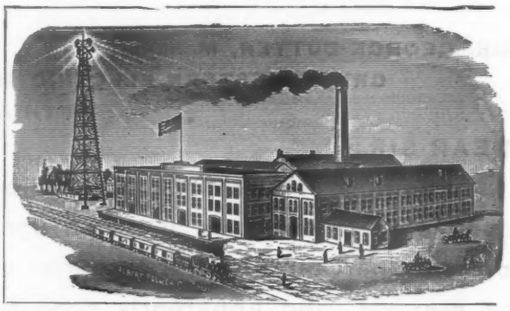
Slattery Induction System

OF INCANDESCENT LIGHTING,

—AND THE—

"WOOD" SYSTEM

OF ARC LIGHTING.



Main Office and Works, Fort Wayne, Ind.

NEW YORK OFFICE, Rooms 25 and 27, 115 BROADWAY,

H. C. ADAMS, Manager.

Manhattan Electric Light Co., 511 Broadway, Sole Licensees and Agents for N. Y. City and Brooklyn

CHICAGO OFFICE, 185 Dearborn St., W. J. BUCKLEY, Manager.

PHILADELPHIA OFFICE, 907 Filbert St., G. A. WILBUR, Manager.

PITTSBURGH OFFICE, 533 WOOD STREET.

SAN FRANCISCO OFFICE, 217 SANSOME STREET

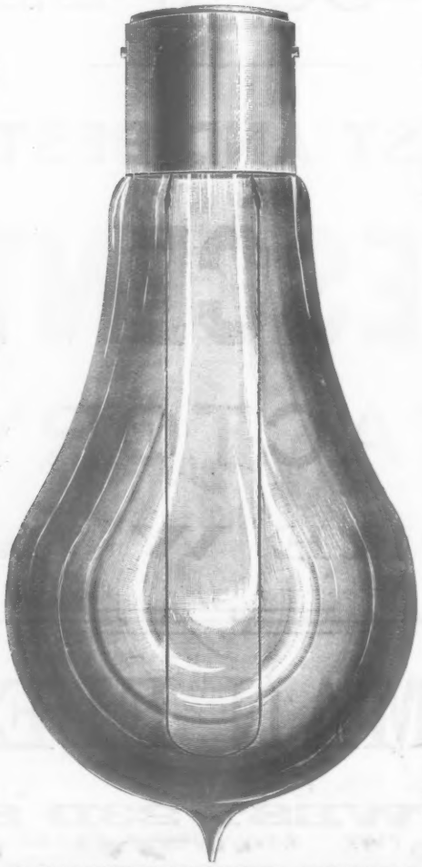
F. ADAMS SUC'S, CITY OF MEXICO.

THE TUCKER ELECTRICAL CONSTRUCTION COMPANY

—AGENTS FOR—

THE PERKINS

Incandescent Lamp



LONGEST LIFE!

NO BLACKENING!

ANY SYSTEM!

Highest Efficiency!

Any Candle Power!

Any Voltage!

CORRESPONDENCE SOLICITED.

THE TUCKER ELECTRICAL CONSTRUCTION COMPANY, 14-20 Whitehall Street, NEW YORK CITY.